BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 142
Energy Reliability and Resilience

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Energy Reliability and Resilience



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Energy reliability is the ability of a power system to consistently deliver power to homes, buildings, and devices—even in the face of instability, uncontrolled

events, cascading failures, or unanticipated loss of system components. Energy resilience is the ability of the grid, buildings, and communities to withstand and rapidly recover from power outages and continue operating with electricity, heating, cooling, ventilation, and other energy-dependent services. Energy resilience increases energy reliability and renewable energy sources can help support a resilient, reliable energy system.

Resilient, reliable energy is critical to the well-being of every American. It keeps life-saving hospital equipment and communications systems operating, buildings at safe temperatures with good ventilation, and American workers to go about their business without interruption. Energy infrastructure—facilities or equipment used to generate, deliver, process, or produce energy—that can withstand and quickly recover from disruptions is resilient and reliable infrastructure.

A resilient and reliable power system reduces the likelihood of long-duration outages over large service areas, limits the scope and impact of outages when they do occur, and rapidly restores power after an outage.

What Makes Energy Resilient?

Power outages can be caused by extreme weather, breaches in cybersecurity, high energy demand that overloads the electric grid, failure of aging equipment, and physical interference with equipment. Grid disturbances are changes in electrical voltage and frequency on the grid that can lead to power outages.

A resilient electric grid distribution system uses local resources, such as solar panels and battery storage in homes and buildings, to quickly reconfigure power flows and recover electricity services during a disturbance. The approach to modernize the grid and

increase resilience focuses on integrating distributed energy resources, advanced controls, grid architecture, and emerging grid technologies at a regional scale.

Strong resilience measures in building energy codes can also ensure that new construction and major renovation projects minimize energy use, maximize comfort, and enhance potentially life-saving resilience benefits. Building owners and operators, communities, and local and state governments can strategically plan to increase resilience using these resources.

What Makes Energy Reliable?

When we diversify our energy mix by adding more types of energy to the grid, we increase our energy reliability. The rise of renewable power, which comes from unlimited energy resources, like wind, sunlight, water, and the Earth's natural heat, has the potential to vastly improve the reliability of the American energy system. Currently, renewable energy generates about 21% of all U.S. electricity, and that percentage is rising quickly.

A reliable electric grid distribution system can continue to deliver electricity to homes and buildings regardless of any disruptions or disturbances. The approach to modernizing the grid to increase resilience and reliability focuses on integrating distributed energy resources, advanced controls, grid architecture, and emerging grid technologies at a regional scale. DOE efforts, like the Energy Storage Grand Challenge Roadmap, will increase resilience.

DOE's Grid Modernization Initiative works with public and private partners to develop concepts, tools, and technologies needed to measure, analyze, predict, protect, and control the grid of the future.

Improving Reliability Through Energy Storage

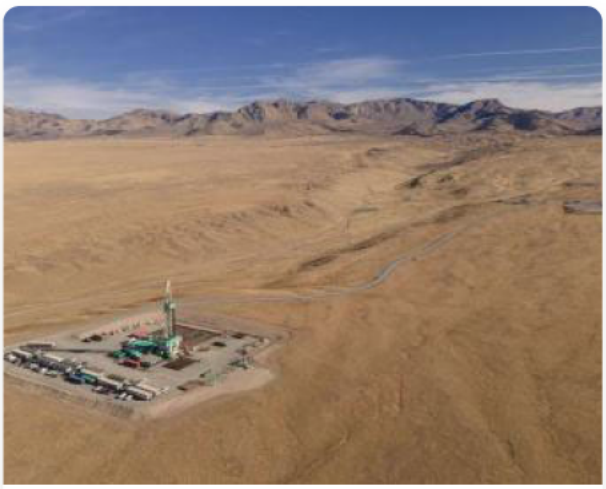
Energy storage technologies can improve energy reliability by making surplus energy available whenever it is needed, such as during a power outage.

Pumped storage hydropower is responsible for most U.S. commercial energy storage capacity and has been used for more than 100 years. Wind energy and solar energy can be captured and stored for later use with batteries, and researchers are investigating geothermal energy storage.

Energy storage is also essential to efficient transportation. EERE invests in research and development of hydrogen storage and batteries to ensure on- and off-road vehicles can reliably move people and goods from one place to another.

The U.S. Department of Energy's Energy Storage Grand Challenge is a comprehensive program to accelerate the development, commercialization, and use of next-generation energy storage technologies. As part of this program, the Long Duration Storage Shot™ aims to, within the decade, reduce the cost of grid-scale energy storage by 90% for systems that can provide energy for at least 10 hours in duration.

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Exhibit 143
NERC 2025–2026 Winter Reliability Assessment

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

2025–2026 Winter Reliability Assessment

November 2025



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Preface

Electricity is a key component of the fabric of modern society, and the Electric Reliability Organization (ERO) Enterprise serves to strengthen that fabric. The vision for the ERO Enterprise, which is comprised of NERC and the six Regional Entities, is a highly reliable, resilient, and secure North American bulk power system (BPS). Our mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid.

Reliability | Resilience | Security

Because nearly 400 million citizens in North America are counting on us

The North American BPS is made up of six Regional Entities as shown in the map and corresponding table below. The multicolored area denotes overlap as some load-serving entities participate in one Regional Entity while associated Transmission Owners/Operators participate in another.



MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RF	ReliabilityFirst
SERC	SERC Reliability Corporation
Texas RE	Texas Reliability Entity
WECC	Western Electricity Coordinating Council

About this Assessment

NERC's *2025–2026 Winter Reliability Assessment* (WRA) identifies, assesses, and reports on areas of concern regarding the reliability of the North American BPS for the upcoming winter season. In addition, the WRA presents peak electricity demand and supply changes and highlights any unique regional challenges or expected conditions that might affect the reliability of the BPS.

The reliability assessment process is a coordinated evaluation between the Reliability Assessment Subcommittee, the Regional Entities, and NERC staff with demand and resource projections obtained from the assessment areas.

This report reflects an independent assessment by the ERO Enterprise (i.e., NERC and the six Regional Entities) and is intended to inform industry leaders, planners, operators, and regulatory bodies so that they are better prepared to ensure BPS reliability. This report also provides an opportunity for industry to discuss plans and preparations to ensure reliability for the upcoming winter period.

Key Findings

This WRA covers the upcoming three-month (December–February) winter period, providing an evaluation of the generation resource and transmission system adequacy necessary to meet projected winter peak demands and operating reserves. This assessment identifies potential reliability issues of interest and regional risks. The following findings are the ERO Enterprise's independent evaluation of electricity generation and transmission capacity as well as the potential operational concerns that may need to be addressed for the upcoming winter.

Two trends affecting resource adequacy across the BPS for the upcoming winter are rising electricity demand forecasts and a continued shift in the resource mix characterized by the retirement of thermal generators and growth in battery resources. After years of flat or low (~1%) peak demand growth, the aggregate peak demand for all NERC assessment areas has risen by 20 GW (2.5%) since the previous winter. Nearly all assessment areas are reporting year-on-year demand growth; some are forecasting increases near 10%. Total BPS resources have also increased since last winter, but by a smaller amount of 9.4 GW. This number includes the net change in generating capacity as well as additional demand response. These demand and resource changes are described in **Escalating Winter Demand** and **Resource Trends** sections.

The following findings are derived from NERC and the ERO Enterprise's independent evaluation of electricity generation and transmission capacity as well as potential operating concerns that should receive attention for Winter 2025–2026:

1. **All areas are assessed as having adequate resources for normal winter peak-load conditions (i.e., the area's 50-50 peak forecast). However, more extreme winter conditions extending over a wide area could result in electricity supply shortfalls.** Prolonged, wide-area cold snaps can drive sharp increases in electricity demand and threaten reliable BPS generation and the availability of fuel supplies for natural-gas-fired generation. Four severe arctic storms have descended to cover much of North America since 2021, causing regional demand for electricity and heating fuel to soar and exposing generation and fuel infrastructure in temperate areas to freezing conditions.[1] The following areas face risks of electricity supply shortfalls during periods of more extreme conditions this winter (see **Figure 1**):

    - **NPCC-Maritimes**: The peak demand forecast has fallen slightly (-1.6%) in the NPCC-Maritimes assessment area, contributing to higher reserves compared to the 2024–2025 winter. Maritimes is projected to have an Anticipated Reserve Margin (ARM) of 16.9%, which is 270 MW below the area's Reference Margin Level of 20% . New Brunswick has long-term energy contracts that can be used to mitigate resource adequacy challenges through the purchase of energy on a day-ahead basis. NPCC's all-hours probabilistic assessment for the NPCC Region included the simulation of both a base case (i.e., normal 50/50 demand) and highest peak load scenario (having an approximate 7% chance of occurring), for both an expected and a low-likelihood, reduced-resource condition. The preliminary results of this assessment indicate that operators in Maritimes are likely to require emergency operating mitigations and/or energy emergency alerts (EEA) during above-normal demand or low-resource output conditions.
    - **NPCC-New England**: A lower peak demand forecast and additional resources from demand response and firm imports offset recent generator retirements, resulting in little change to the NPCC-New England ARM for this winter. New England continues to closely monitor regional energy adequacy, particularly during extended cold snaps where constrained natural gas pipelines contribute to rapid depletion of stored fuel supplies. ISO-NE's deterministic winter scenario analysis shows limited exposure to energy shortfalls this winter. In New England, winter energy concerns are highest in scenarios when stored fuels are rapidly depleted; during these periods, timely replenishment is critical to minimizing the potential for energy shortfalls.
    - **SERC-East**: The winter peak demand forecast has increased by 700 MW (1.6%) since last winter, while winter firm capacity has declined, resulting in lower reserves. SERC-East has changed from a summer-peaking area to potentially peaking during both summer and winter. This is due to the continued addition of solar photovoltaic (PV) generation that shaves off summer peak demand and a trend toward electrification of heating that drives up winter peak demand. All-hours probabilistic analysis from SERC found some load-loss hours (<0.1 hrs) and small amounts of expected unserved energy, with the highest risk occurring during above-normal peak demand and early morning hours when solar output is absent.
    - **SERC-Central:** Additional demand response and flat load growth since last winter is offsetting declining resource capacity (down 1,120 MW), resulting in little change to the ARM at 30.5%. There are adequate resources for normal winter peak demand; however, higher levels of demand that can occur during extreme cold temperatures can result in insufficient reserves that operators would need to manage with non-firm imports and potential energy emergencies.
    - **Texas RE-ERCOT:** Strong load growth from new data centers and other large industrial end users is driving higher winter electricity demand forecasts and contributing to continued risk of supply shortfalls. For the upcoming winter season, Texas RE-ERCOT is expected to continue facing reserve shortage risks during the peak load hour and high-

[1] See detailed reports on the January 2024 and January 2025 Arctic Storms, Winter Storm Elliott, and Winter Storm Uri.

net-load hours, particularly under extreme load conditions that accompany freezing temperatures. Elevated forced outage of thermal resources and reduced output from intermittent resources during these conditions exacerbates the risk of supply shortfalls. In winter, peak demands typically occur before sunrise and after sunset coinciding with the unavailability of solar generation making the system dependent on wind generation and dispatchable resources. Data centers are altering the daily load shape due to their round-the-clock operating pattern, lengthening peak demand periods. Additional battery storage and demand-response resources since last winter help mitigate shortfall risks. However, with the continued flattening of the load curve, maintaining sufficient battery state of charge will become increasingly challenging for extended periods of high loads, such as a severe multi-day storm like Winter Storm Uri.

- **WECC-Basin**: There is sufficient capacity in the area for expected peak conditions; however, Balancing Authorities (BA) are likely to require external assistance during extreme winter weather that causes thermal plant outages, adverse wind turbine conditions, and natural gas fuel supply issues for area internal resources. External assistance may not be available during region-wide extreme winter conditions. With an expected winter peak demand of 11.1 GW, under an extreme combination of generator derates and outages, the region could be short 1.6 GW before imports. Forecasted net internal demand has increased 1% since last year, with little change in winter capacity. Note that the WECC-Basin assessment area includes Utah, southern Idaho, and a portion of western Wyoming. In prior WRA reports, this part of the BPS was included as part of the WECC-NW assessment area. The *2025–2026 WRA* includes a new assessment area map for the Western Interconnection. The new assessment area boundaries provide reliability risk information in more geographic detail for the United States and Mexico.
- **WECC-NW**: Like WECC-Basin, there is sufficient capacity in the area for expected peak conditions; however, BAs are likely to require external assistance during extreme winter weather that causes thermal plant outages and adverse wind turbine conditions for area internal resources. External assistance may not be available during region-wide extreme winter conditions. Winter peak demand for the area is forecast to be 2.9 GW higher (9.3%) compared to last year. Over 3 GW of new resources have been in development for the assessment area this year, primarily battery storage, solar PV, and wind resources. Delays that threaten timely completion of these resource additions will make the area more reliant on imports to meet peak demand.

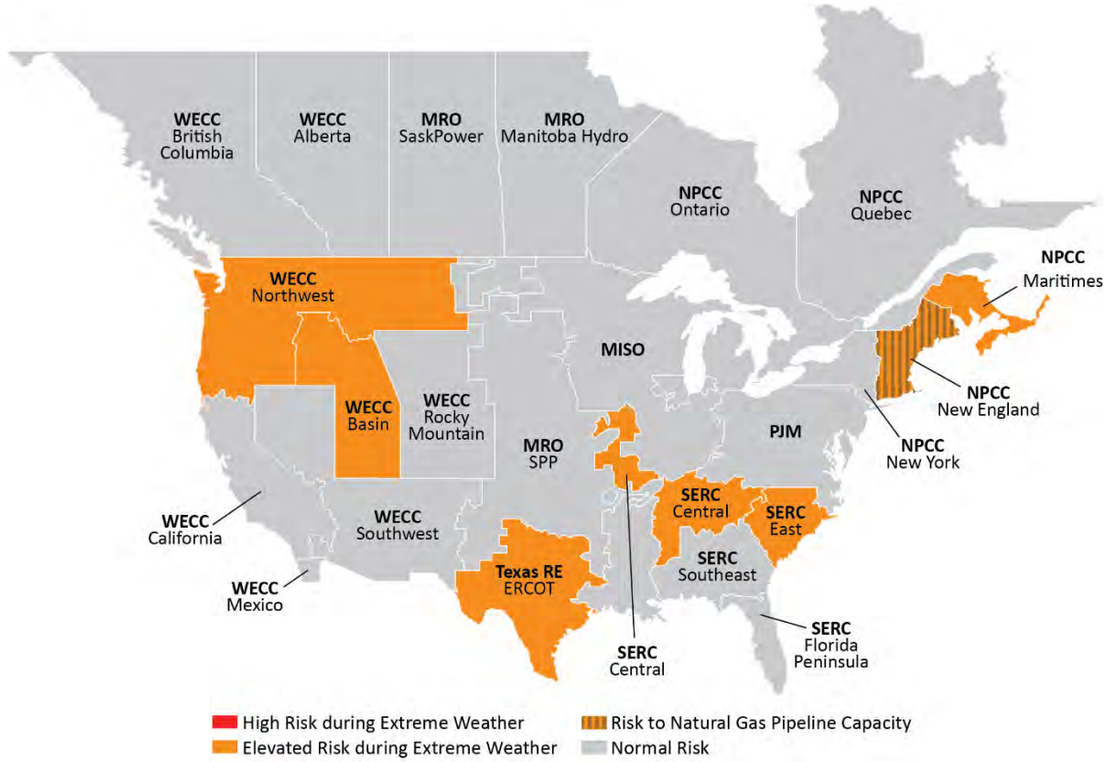


Figure 1: Winter Reliability Risk Area Summary

2. **The performance of natural gas production and supply infrastructure during peak winter conditions will again have a significant effect on BPS reliability.** Natural gas is an essential fuel for electricity generation in winter. Winter fuel supplies for thermal generators must be readily available during the periods of high electricity and natural gas demand that accompany extreme cold weather. Yet these periods are the most challenging for natural-gas-fired Generator Operators to obtain sufficient fuel and delivery. Natural gas production often falls off in extreme winter temperatures as supply infrastructure is affected by freezing issues, and Generator Operators that fail to secure firm fuel delivery are frequently unable to access fully subscribed pipelines. Evidence from the past two winters indicates notable improvement in the delivery of natural gas to BPS generators since winter storms Elliott and Uri with overall less natural gas production decline during cold weather and fewer natural gas infrastructure

force majeures.[2] Still, natural gas infrastructure freeze protection mitigations are voluntary for the natural gas industry in most of North America, resulting in uneven application of protections and continued supply risks during extreme conditions. Furthermore, timing misalignments between the natural gas and electric markets continue to challenge generator fuel procurement in advance of severe winter conditions that occur over winter holiday weekends. As winter approaches, NERC encourages all entities across the gas-electric value chain—from production to the burner tip—to take all necessary preparations for extreme cold and keep natural gas flowing and the lights on.

3. **Cold weather Reliability Standards first introduced in 2023 have been improved prior to the upcoming winter and address recommendations from winter storms Elliott and Uri.** In September 2025, the Federal Energy Regulatory Commission (FERC) approved EOP-012-3 with an effective date of October 1, 2025, concluding the development of Reliability Standards for generator cold weather preparedness.[3] The EOP-012 Reliability Standard contains requirements for generator freeze protection measures, cold weather preparedness plans, and operator training. Among the improvements in the new version are enhanced and expanded requirements to ensure that Generator Owners (GO) are implementing corrective actions to address known issues affecting their ability to operate in cold weather in a timely manner. NERC collects data on the winterization of generating units, which, in conjunction with NERC's monitoring of BPS performance and analysis of cold weather events, helps determine the effectiveness of Reliability Standards. NERC submitted to FERC its first annual *Cold Weather Data and Analysis* informational filing in October 2025.[4] Based on the data reported this year, 96% of the total net winter capacity reported extreme cold weather temperatures (ECWT) at or below 32 degrees Fahrenheit, triggering winter preparedness measures under the Cold Weather Preparedness Standard, and 99% of total net winter capacity in the continental US reporting the ability to operate at the calculated ECWT. As the first such report, this *Cold Weather Data and Analysis* filing provides a benchmark for future analysis.

Recommendations

To reduce the risks of energy shortfalls on the BPS this winter, NERC recommends the following:

- Reliability Coordinators (RC), BAs, and Transmission Operators (TOP) in the elevated risk areas identified in the key findings should review seasonal operating plans and the protocols for communicating and resolving potential supply shortfalls in anticipation of potentially high generator outages and extreme demand levels. Operators should review NERC's Resources on Cold Weather Preparations.
- GOs should complete winter readiness plans and checklists prior to December, deploy weatherization packages well in advance of approaching winter storms, and frequently check and maintain cold weather mitigations while conditions persist.
- BAs should be cognizant of the potential for short-term load forecasts to underestimate load in extreme cold weather events and be prepared to take early action to implement protocols and procedures for managing potential reserve deficiencies. Proactive issuance of winter advisories and other steps directed at generator availability contributed to improved reliability during cold weather events of the past two winters.
- RCs and BAs should implement generator fuel surveys to monitor the adequacy of fuel supplies. They should prepare their operating plans to manage potential supply shortfalls and take proactive steps for generator readiness, fuel availability, load curtailment, and sustained operations in extreme conditions.
- Generator Owners/Operators of natural-gas-fired units should maintain awareness of potential extreme cold weather developing over holiday weekends and the implications for fuel planning and procurement that may result given the natural gas purchase close dates that precede long holiday weekends.
- State and provincial regulators can assist grid owners and operators in advance of and during extreme cold weather by maintaining awareness of BA, natural gas pipeline, and gas local distribution company (LDC) operational public announcements and notices, amplifying public appeals for electricity and natural gas conservation, and supporting requested environmental and transportation waivers.

[2] See *January 2025 Arctic Events | A System Performance Review*, April 2025
[3] See NERC's Statement on FERC September Open Meeting for summary and link to FERC's order.
[4] See 2025 Cold Weather Data Collection and Analysis Informational Filing

Risk Highlights

Escalating Winter Demand

Winter electricity demand is rising at the fastest rate in recent years, particularly in areas where data center development is occurring. After several years of low (~1%) growth, total internal demand for the BPS is forecast to increase by 20.2 GW (2.5%) over last winter's forecast. The changes in forecasted net internal demand for each assessment area are shown in Figure 2 below.[5] Assessment areas develop these forecasts based on historical load and weather information as well as future projections. Most assessment areas are projecting an increase in peak demand. SaskPower, PJM, the U.S. Southeast, and parts of the U.S. West have the largest increase in peak demand forecasts.

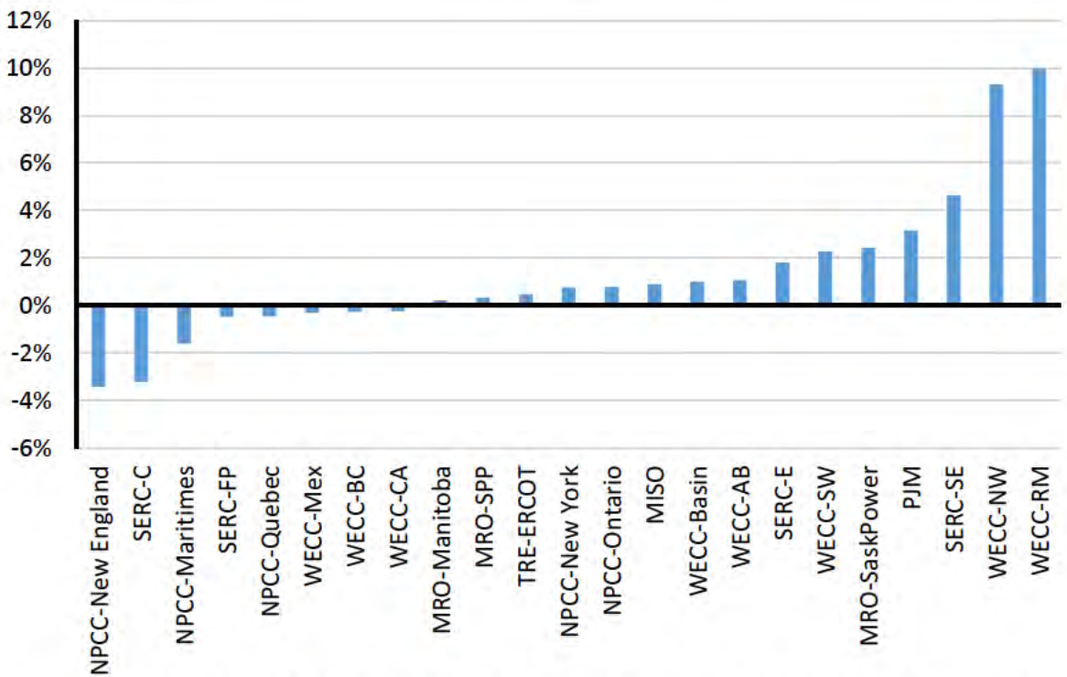


Figure 2: Change in Net Internal Demand—Winter 2025–2026 Forecast Compared to Winter 2024–2025 Forecast

[5] See **Data Concepts and Assumptions** section for demand definitions.

Resource Trends

BPS resources are growing, but at a slower rate than demand is rising. Battery and solar facilities were the leading resource types added to the BPS since last winter. Solar resources, however, often do not supply output during hours of peak winter demand. Growth in demand response is also contributing to BPS resources for the upcoming winter. Table 1 shows the total change in BPS resources since last winter. For battery, solar, and wind resources, the table includes change in both nameplate (installed) capacity as well as the change in on-peak demand capacity, which is the capacity that resources are expected to provide in their area during the time of peak demand. For assessment-area specific information see Variable Energy Resource Contributions section.

Table 1: BPS Resource Change from Winter 2024–2025 to Winter 2025–2026

Resource	Net Change Nameplate Capacity (MW)	Net Change Peak Demand Capacity (MW)
Total Generator Capacity		1,335
Battery	19,659	11,121
Solar	11,097	1,176
Wind	-562	-14,238
Thermal and Hydro		3,276
Demand Response		8,112
Total Resources		9,447

Total BPS resources for serving winter peak demand, including generating capacity and demand response, have increased since last winter by 9,447 MW. Sizeable additions in battery resources and some new natural gas-fired generators contribute to the increase in resource capacity. However, the increase is offset by lower on-peak capacity values for wind resources, which are the result of revised valuations of wind resource capability at peak demand hours in some areas.[6] As a result, BPS generator capacity for winter peak demand makes up only a small portion of the total BPS increase. Generation accounts for 1,335 MW of the total 9,445 MW increase, while the larger share comes from demand response programs. Area specific information on demand response is provided in the Demand and Resource Tables.

The recent trend in resource additions is contributing to higher risk of electricity supply shortfalls in winter. BA operators are likely to face higher winter demand without a comparable increase in supply resources. Furthermore, the types of resources that are growing the most-- battery resources and

[6] Since last winter, ERCOT and MISO have implemented new methods for determining capacity contributions that result in lower wind and solar resources contributions at peak demand. See ERCOT's Resource Adequacy page and MISO's *Planning Year 2025-2026 Wind and Solar Capacity Credit Report*.

demand response—have unique characteristics that operators will need to account for and could limit the use of these resources in extreme winter conditions. Battery energy is reliable when it can be dispatched and has sufficient charge for the period it is needed, yet little time to recharge can be expected during extreme winter weather. System operators will need good visibility on battery state of charge and should anticipate that some extreme winter events will cause these resources to become depleted when needed. Demand response is limited by contract terms, which typically specify how often and for how long the resource may be used. Other resource types are also challenged in winter (see **Thermal Generator Fuel Adequacy and Security**). As BAs grapple with higher demand in most parts of the BPS, they will do so with resources that are becoming increasingly complex to dispatch especially in winter.

Thermal Generator Fuel Adequacy and Security

The performance of the thermal generator fleet remains critical to winter BPS operations. Winter fuel supplies for thermal generators must be readily available during periods of high demand and extreme cold weather. Generally, fuel adequacy for the thermal generating fleet is bolstered through strategic infrastructure investments and fuel stockpiling that increases the certainty of having fuel on hand that can be converted to electricity when needed. Because of this, winter performance of thermal generators is inextricably linked to extraction, processing, storage, and delivery infrastructure for a variety of fuels. Fuel supply risks have been noted in recent years' WRAs related to coal and natural gas availability and illustrate the interconnected nature of these critical energy infrastructure systems.

BPS stakeholders across North America note multiple fuel-related issues that are being monitored entering the winter season. For example, while coal represents a waning share of the overall resource mix, it continues to play an important role in meeting demand during extreme winter weather events, and oil inventories at dual-fuel gas-oil generators lessen risks related to natural gas deliverability in infrastructure-constrained regions, especially during the winter. Notably, it is infeasible or prohibitively costly to stockpile natural gas locally at power plants, and this exposes the BPS to the risk profile of the constituent systems that comprise the supply and delivery of this just-in-time fuel.

Natural Gas Generator Fuel Supplies

Natural gas generators remain a crucial part of on-peak resources meant to meet winter electricity demand across much of North America. While many Generator Owners and Operators secure backup fuel supplies at critical gas-fired generators, particularly in the northeastern United States and Florida, large contributions to the on-peak winter resource mix by single-fuel natural-gas-fired generators remain across North America (see **Figure 3**).

Natural gas generator performance can be threatened when natural gas supplies are insufficient or when natural gas infrastructure is unable to maintain the flow of fuel to critical generators. Grid operators continue to acknowledge and enhance their winter planning processes to firm up their fuel supplies and guard against natural gas disruptions, but winter storms Uri and Elliott demonstrated that combinations of natural gas flow restrictions and supply insufficiency can occur regardless of whether cold temperatures are common or uncommon in the region and can affect more than one BA area concurrently.

Many BPS areas that regularly experience cold weather events, like New England, have adopted mitigating technologies to lessen the impact of natural gas shortages through generator dual-fuel capability and stored backup fuel. In those areas, prolonged cold weather events present a risk of rapid depletion of stored backup fuel. Robust regional and distributed storage investments and winter planning for timely fuel replenishment are critical to minimizing potential energy shortfalls in the operational time frame in these areas.

Natural gas and electricity infrastructures have the added complexity of interdependence. Electricity is used to power some facilities, such as compressor stations and processing plants that make up natural gas infrastructure. These interdependencies mean that reliability events that originate on one system have the potential to affect the other and worsen the overall event magnitude or duration.

Natural gas infrastructure freeze protection mitigations are voluntary for the natural gas industry in most of North America. Texas is an exception, where the Railroad Commission of Texas adopted rules to require critical natural gas facilities to implement weather-related emergency preparation measures.[7] Lack of consistent standards for natural gas infrastructure protections will result in uneven application of freeze protections and continued supply risks during extreme conditions in many areas.

These considerations have driven higher levels of coordination to ensure sustained reliable operation of the natural gas and electricity systems. While a FERC and ERO staff review of system performance during the January 2025 arctic events[8] details improvements in electric and natural gas coordination since winter storms Uri and Elliott, the review also identifies continuing gaps between the electricity and natural gas industries that remain entering the 2025–2026 Winter season. These include natural gas scheduling challenges during winter holiday weekends, market time frame and process incompatibility, and electric power entities' lack of visibility into operational impact data from natural gas producers and suppliers.

[7] See Railroad Commission of Texas weatherization rule.

[8] FERC, NERC Issue Report on System Performance During the January 2025 Arctic Weather | Federal Energy Regulatory Commission

The U.S. Energy Information Administration (EIA)[9] anticipates a slightly milder winter than last year across much of the United States, especially in the Northeast, leading to a projection that households will consume approximately 2% less natural gas than last winter. Working natural gas storage inventories are about 5% above the previous five-year average in the United States heading into the winter season. The EIA attributes this relative surplus in part to robust production this summer and lower-than-expected natural gas consumption by power generators.



Single-Fuel Natural-Gas-Fired Generation

	Winter Capacity (GW)	Contribution to Total Winter Resource Mix
MISO	63.9	38%
TRE-ERCOT	53.0	38%
WECC-MX	2.2	34%
MRO-SaskPower	2.5	34%
SPP	33.4	32%
NPCC-New England	12.1	24%
PJM	60.9	23%
WECC-AB	13.9	23%
NPCC-Ontario	8.0	23%
SERC-FP	45.6	21%
WECC-CA	35.9	18%
WECC-SW	21.5	17%
WECC-Basin	4.9	16%
WECC-RM	6.2	14%
SERC-C	17.0	13%
SERC-SE	21.5	13%
WECC-NW	8.7	12%
SERC-E	11.3	9%
NPCC-New York	5.0	8%
NPCC-Maritimes	0.5	7%
MRO-Manitoba	0.3	4%
WECC-BC	0.1	1%
NPCC-Quebec	0.0	0%

Figure 3: Single-Fuel Natural-Gas-Fired Generation Capacity Contribution to the 2025–2026 Winter Generation Mix

[9] See the U.S. Energy Information Administration's Winter Fuels Outlook 2025–26

Risk Assessment Discussion

NERC assesses the risk of electricity supply shortfall in each assessment area for the upcoming season by considering Planning Reserve Margins, seasonal risk scenarios, probability-based risk assessments, and other available risk information. NERC provides an independent assessment of the potential for each assessment area to have sufficient operating reserves under normal conditions as well as above-normal demand and low-resource output conditions selected for the assessment. A summary of the assessment approach is provided in Table 2.

Table 2: Seasonal Risk Assessment Summary

Category	Criteria[1]
High Potential for insufficient operating reserves in normal peak conditions	• Planning Reserve Margins do not meet Reference Margin Levels (RML); or • Probabilistic indices exceed benchmarks, e.g., loss of load hours (LOLH) of 2.4 hours over the season; or • Analysis of the risk hour(s) indicates resources will not be sufficient to meet operating reserves under **normal peak-day demand and outage scenarios**[2]
Elevated Potential for insufficient operating reserves in above-normal conditions	• Probabilistic indices are low but not negligible (e.g., LOLH above 0.1 hours over the season); or • Analysis of the risk hour(s) indicates resources will not be sufficient to meet operating reserves under **extreme peak-day demand with normal resource scenarios** (i.e., typical or expected outage and derate scenarios for conditions);[2] or • Analysis of the risk hour(s) indicates resources will not be sufficient to meet operating reserves under **normal peak-day demand with reduced resources** (i.e., extreme outage and derate scenarios)[3]
Normal Sufficient operating reserves expected	• Probabilistic indices are negligible • Analysis of the risk hour(s) indicates resources will be sufficient to meet operating reserves under normal and extreme peak-day demand and outage scenarios[4]

Table Notes:
[1]The table provides general criteria. Other factors may influence a higher or lower risk assessment.
[2]**Normal resource scenarios** include planned and typical forced outages as well as outages and derates that are closely correlated to the extreme peak demand.
[3]**Reduced resource scenarios** include planned and typical forced outages and low-likelihood resource scenarios, such as extreme low-wind scenarios, low-hydro scenarios during drought years, or high thermal outages when such a scenario is warranted.
[4]Even in normal risk assessment areas, extreme demand and extreme outage scenarios that are not closely linked may indicate risk of operating reserve shortfall.

Assessment of Planning Reserve Margins and Operational Risk Analysis

Anticipated Reserve Margins (ARM), which provide the Planning Reserve Margins for normal peak conditions, as well as reserve margins with typical forced outage levels and for the most extreme seasonal risk scenarios are provided in Table 3.

Table 3: Seasonal Risk Scenario On-Peak Reserve Margins

Assessment Area	Anticipated Reserve Margin	Reserve Margin with Typical Outages	Reserve Margin with Higher Demand, Outages, Derates in Extreme Conditions
MISO	49.5%	22.3%	3.7%
MRO-Manitoba	13.7%	11.4%	6.1%
MRO-SaskPower	35.1%	29.0%	16.1%
MRO-SPP	56.5%	29.4%	16.9%
NPCC-Maritimes	16.9%	12.5%	-4.7%
NPCC-New England	58.9%	45.4%	8.7%
NPCC-New York	78.2%	52.4%	16.2%
NPCC-Ontario	28.6%	21.8%	13.2%
NPCC-Québec	15.2%	15.1%	5.0%
PJM	35.6%	24.8%	15.6%
SERC-C	30.5%	22.4%	-0.9%
SERC-E	21.9%	17.5%	3.0%
SERC-FP	41.7%	28.3%	25.6%
SERC-SE	39.7%	24.7%	17.7%
TRE-ERCOT	36.0%	25.2%	-20.0%
WECC-AB	35.2%	32.4%	10.0%
WECC-Basin	29.6%	19.7%	-21.1%
WECC-BC	25.9%	25.8%	15.4%
WECC-CA	82.3%	73.7%	57.9%
WECC-Mex	83.1%	79.4%	52.9%
WECC-NW	30.9%	29.5%	-8.5%
WECC-RM	61.7%	53.2%	10.0%
WECC-SW	104.4%	90.1%	50.1%

Seasonal risk scenarios for each assessment area are presented in the Regional Assessments Dashboards section. The on-peak reserve margin and seasonal risk scenario charts in each dashboard provide potential winter peak demand and resource condition information. The reserve margins on the right side of the dashboard pages provide a comparison to the previous year's assessment. The seasonal risk scenario charts present deterministic scenarios for further analysis of different demand and resource levels with adjustments for normal and extreme conditions. The assessment areas determined the adjustments to capacity and peak demand based on methods or assumptions that are summarized in the seasonal risk scenario charts; more information about these dashboard charts is provided in the Data Concepts and Assumptions section.

The seasonal risk scenario charts can be expressed in terms of reserve margins: In Table 3, each assessment area's ARMs are shown alongside the reserve margins for a typical generation outage scenario (where applicable) and the extreme demand and resource conditions in their seasonal risk scenario.

Areas highlighted in orange in Figure 1 above have been identified as having resource adequacy or energy risks for the winter and are included in the Key Findings section's discussion that follows. The typical outage reserve margin includes anticipated resources minus the capacity that is likely to be in maintenance or forced outage at peak demand. If the typical maintenance or forced-outage margin is the same as the ARM, it is because an assessment area has already factored typical outages into the anticipated resources. The extreme conditions margin includes all components of the scenario and represents the most severe operating conditions of an area's scenario. Note that any reserve margin below zero indicates that the resources fall below demand in the scenario.

In addition to the peak demand and seasonal risk hour scenario charts, the assessment areas provided a resource adequacy risk assessment that was probability-based for the winter season. Results are summarized in Table 5. The risk assessments account for the hour(s) of greatest risk of resource shortfall. For most areas, the hour(s) of risk coincides with the time of forecasted peak demand; however, some areas incur the greatest risk at other times based on the varying demand and resource profiles. Various risk metrics are provided and include loss of load expectation (LOLE), loss of load hours (LOLH), expected unserved energy (EUE), and the probabilities of energy emergency alert (EEA) declarations (see Table 4 for a description of EEA levels).

Table 4: Energy Emergency Alert Levels

EEA Level	Description	Circumstances
EEA 1	All available generation resources in use	• The BA is experiencing conditions in which all available generation resources are committed to meet firm load, firm transactions, and reserve commitments and is concerned about sustaining its required operating reserves. • Non-firm wholesale energy sales (other than those that are recallable to meet reserve requirements) have been curtailed.
EEA 2	Load management procedures in effect	• The BA is no longer able to provide its expected energy requirements and is an energy-deficient BA. • An energy-deficient BA has implemented its operating plan(s) to mitigate emergencies. • An energy-deficient BA is still able to maintain minimum operating reserve requirements.
EEA 3	Firm load interruption is imminent or in progress	• The energy-deficient BA is unable to meet minimum operating reserve requirements.

Energy Emergency Alerts

The combination of above-normal generation outages, low resource output, and peak loads as occurred during the extreme cold weather events of Winter Storm Uri in 2021 and Winter Storm Elliott in 2022 are ongoing winter reliability risks. When supply resources in an area fall below expected demand and operating reserve requirements, BAs may need to employ EEAs to maintain balance between available capacity and energy and real-time demand. A description of each EEA level is provided above.

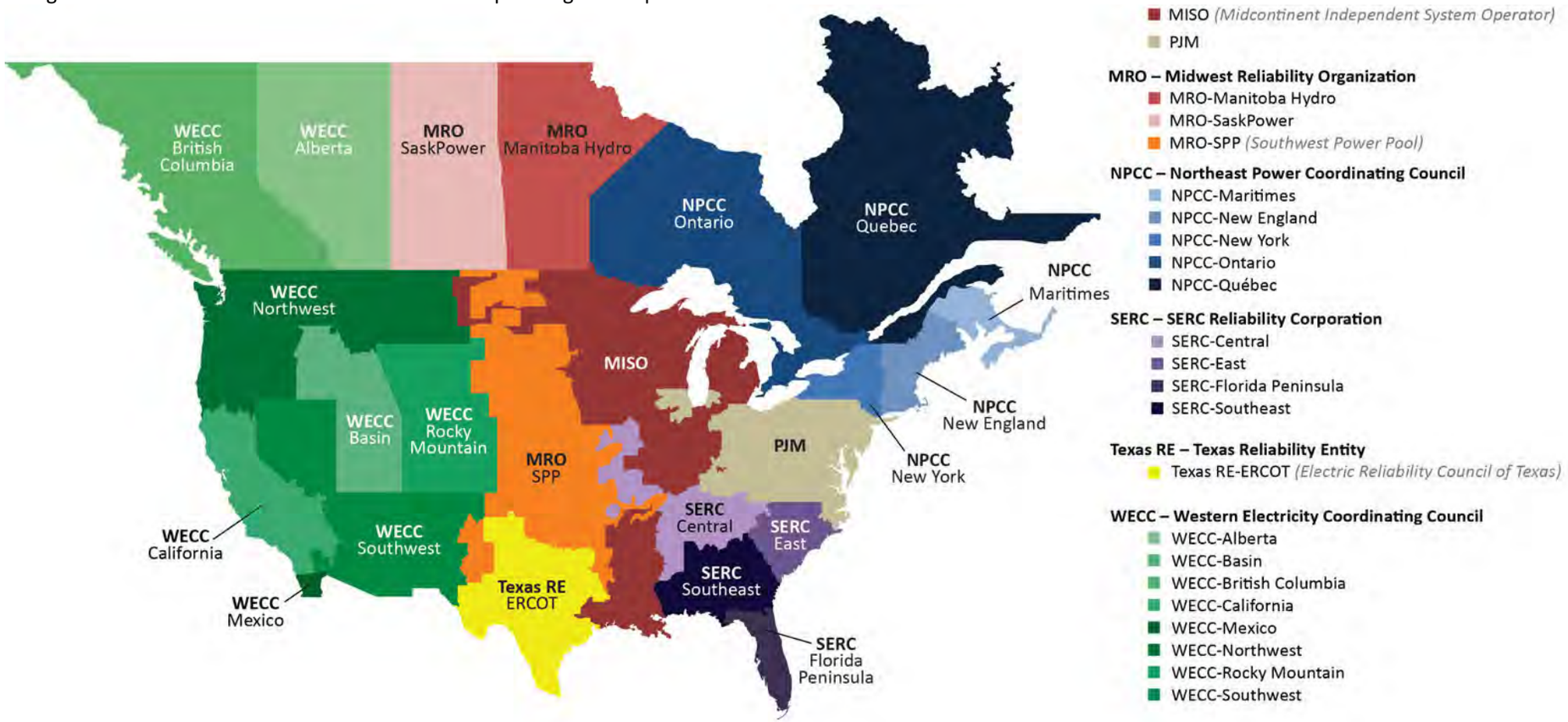
Table 5: Probability-Based Risk Assessment		
Area	**Type of Assessment**	**Results and Insight from Assessment**
MISO	Deterministic	MISO does not provide a probabilistic assessment for the WRA. MISO applies a deterministic look at expected system conditions, looking at generation availability under typical and extreme outages and looking at a typical 50/50 load forecast and an extreme 90/10 load forecast. For the upcoming winter season, under an extreme outage and extreme 90/10 load forecast, this is the riskiest scenario for the MISO footprint. This scenario produces the shortest actual reserve margin for January.
MRO-Manitoba	Probabilistic study for the NERC Probabilistic Assessment (ProbA)	Probabilistic analysis for the 2024 ProbA summarized in NERC's 2024 *Long-Term Reliability Assessment* (LTRA) found no load-loss or unserved energy hours for 2026.
MRO-SaskPower	Probability-based capacity adequacy assessment	SaskPower's probabilistic assessment for the 2025–2026 Winter indicates that risk of shortfalls is lower than the previous winter. LOLH for an elevated risk scenario for the 2025–2026 Winter season is 0.08 hours. The month with the highest LOLH is December (0.05 hours).
MRO-SPP	NERC 2024 ProbA	Probabilistic analysis for the 2024 ProbA summarized in NERC's 2024 LTRA found no load-loss or unserved energy hours for 2026.
NPCC	NPCC conducted an all-hour probabilistic reliability assessment that included detailed neighbor modeling and consisted of a base case and severe case examining low resources, reduced imports, and higher loads. The assessment evaluates the probabilistic indices of LOLE, LOLH, and EUE. The highest peak load scenario has an approximately 7% probability of occurring.	
NPCC-Maritimes	The Maritimes Area low-likelihood resource case assumed: wind derated by 50% for every hour in December through February and a 50% natural gas capacity curtailment for December through February (dual-fuel units assumed reverting to oil) and reduced transfer capabilities.	The preliminary assessment indicates that established operating procedures are not sufficient to maintain a balance between electricity supply and demand. Under highest peak load levels, the Maritimes Area shows a notable likelihood of utilizing its operating procedures such as reducing 30-minute reserves, initiating interruptible loads, and reducing 10-minute reserves to maintain system reliability during the upcoming winter period.
NPCC-New England	The New England Area low-likelihood resource case assumed: 500 MW of additional maintenance outages, ~4,513 MW of gas-fired generation unavailable due to fuel supply constraints, and 50% reduced import capabilities of external ties.	The preliminary results of this assessment indicate that operating procedures were not needed to maintain a balance between electricity supply and demand
NPCC-New York	The New York Area low-likelihood resource case assumed: ~500 MW of extended maintenance in southeastern New York, 600 MW of cable transmission reduction across HVdc facilities, and ~5,000 MW of generation unavailable due to fuel delivery issues.	The preliminary results of this assessment indicate that operating procedures were not needed to maintain a balance between electricity supply and demand. No cumulative LOLE, LOLH or EUE risks were indicated over the December–February winter period, for all the scenarios modeled.
NPCC-Ontario	An energy assessment for the Ontario Assessment Area was conducted for two scenarios: firm resources and firm demand with expected weather, and planned resources with planned demand with expected weather.	No cumulative LOLH or EUE risks were identified over the entire November-to-April winter season for both scenarios modeled.

Table 5: Probability-Based Risk Assessment		
Area	**Type of Assessment**	**Results and Insight from Assessment**
NPCC-Québec	The Québec Area low-likelihood resource case assumed 1,000 MW of generation reductions.	The preliminary results of this assessment indicate that established operating procedures are sufficient to maintain a balance between electricity supply and demand if needed. No cumulative LOLE, LOLH or EUE risks were indicated over the December–February winter period for all the scenarios modeled
PJM	Probabilistic study for the NERC Probabilistic Assessment (ProbA)	Probabilistic study for 2025–2026 Winter is not provided for the WRA. PJM performed probabilistic analysis for 2026-2027 winter as part of the 2024 ProbA summarized in NERC's 2024 LTRA. The results of this study indicate risk of load loss (<0.1 hours) and unserved energy during winter months. For the upcoming winter, load-loss hours are expected to be less than this value because forecasted load is lower and anticipated resource capacity is higher than the case studied for the 2024 ProbA.
SERC	Based on the 2024 NERC Probabilistic Assessment (ProbA) base-case result. SERC's assessment used 38 years of historical load shapes to assess the resource adequacy of years 2026 and 2028, primarily based on data from the 2024 Long Term Reliability Assessment (LTRA).	
SERC-Central		Probabilistic analysis for the 2024 ProbA summarized in NERC's 2024 LTRA found no load-loss or unserved energy hours for 2026.
SERC-East		Probabilistic analysis for the 2024 ProbA summarized in NERC's 2024 LTRA found a small number of load-loss hours (<0.1) and EUE (61 MWh / 1 ppm) for 2026.
SERC-Florida Peninsula		Probabilistic analysis for the 2024 ProbA summarized in NERC's 2024 LTRA found negligible load-loss hours and EUE.
SERC-Southeast		Probabilistic analysis for the 2024 ProbA summarized in NERC's 2024 LTRA found no load-loss or unserved energy hours for 2026.
Texas RE-ERCOT	ERCOT Probabilistic Reserve Risk Model	ERCOT's probabilistic risk assessment indicates a 2% probability of having to declare EEAs during the January forecasted winter peak day (which coincides with the highest reserve shortage risk) and a controlled load shed probability of 1.8%. ERCOT defines low-risk hours as when the probability of an EEA is less than 10%.
WECC	The resource adequacy work performed at WECC used the Multi-Area Variable Resource Integration Convolution (MAVRIC) model for the 2025 LTRA. The MAVRIC model is a convolution-based probabilistic model and is WECC's chosen method for developing probability metrics used for assessing demand and variable resource availability in every hour. In the resource adequacy environment, the reports produced support NERC's seasonal assessments, LTRA, and ProbA.	
WECC-AB		The results of the probabilistic assessment reveal no EUE or LOLH for Winter 2025–2026.
WECC-Basin		The results of the probabilistic assessment reveal no EUE or LOLH for Winter 2025–2026.
WECC-BC		The results of the probabilistic assessment reveal no EUE or LOLH for Winter 2025–2026.

Table 5: Probability-Based Risk Assessment		
Area	**Type of Assessment**	**Results and Insight from Assessment**
WECC-CA		The results of the probabilistic assessment reveal no EUE or LOLH for Winter 2025–2026.
WECC-Mexico		The results of the probabilistic assessment reveal no EUE or LOLH for Winter 2025–2026.
WECC-Rocky Mountain		The results of the probabilistic assessment reveal no EUE or LOLH for Winter 2025–2026.
WECC-NW		The results of the probabilistic assessment reveal no EUE or LOLH for Winter 2025–2026. Results for a case where new resource additions are not completed for the upcoming winter found some EUE and LOLH.
WECC-SW		The results of the probabilistic assessment reveal no EUE or LOLH for Winter 2025–2026.

Regional Assessments Dashboards

The following assessment area dashboards and summaries were developed based on data and narrative information collected by NERC from the six Regional Entities on an assessment area basis. Guidelines and definitions are in the **Data Concepts and Assumptions** table. On-Peak Reserve Margin bar charts show the ARM compared to a reference margin level (RML) that is established for each area to meet resource adequacy criteria. Prospective Reserve Margins can give an indication of additional on-peak capacity but are not used for assessing adequacy. The operational risk analysis shown in the following regional assessments dashboard pages provides a deterministic scenario for understanding how various factors that affect resources and demand can combine to impact overall resource adequacy. For each assessment area, there is a risk-period scenario graphic; the left blue column shows anticipated resources (from the **Demand and Resource Tables**), and the two orange columns at the right show the two demand scenarios of the normal peak net internal demand (from the **Demand and Resource Tables**) and the extreme winter peak demand determined by the assessment area. The middle red or green bars show adjustments that are applied cumulatively to the anticipated resources. Adjustments may include reductions for typical generation outages (maintenance and forced not already accounted for in anticipated resources) and additions that represent the quantified capacity from operational tools (if any) that are available during scarcity conditions but have not been accounted for in the WRA reserve margins. Resources throughout the scenario are compared against expected operating reserve requirements that are based on peak load and normal weather. The cumulative effects from extreme events are also factored in through additional resource derates or low-output scenarios. In addition, results from a probability-based resource adequacy assessment are shown in the Highlights section of each dashboard. Methods vary by assessment area and provide further insights into the risk conditions forecasted for this upcoming winter period.



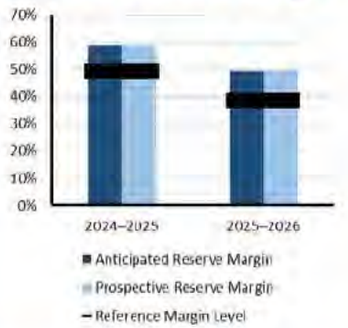


MISO

The Midcontinent Independent System Operator, Inc. (MISO) is an independent, not-for-profit organization responsible for operating the bulk electric power system and administering wholesale electricity markets across 15 U.S. states and the Canadian province of Manitoba. MISO ensures the reliable delivery of electricity to approximately 45 million people by managing regional transmission operations as well as energy and ancillary services markets and advising on long-term resource planning. The MISO footprint includes 39 Local BAs and more than 550 market participants. MISO operates one of the world's largest organized electricity markets, with its members operating a system that consists of over 77,000 miles of transmission lines and approximately 1,888 generating units. The peak electricity demand on the MISO system currently occurs during the summer season. MISO's footprint lies across three regional entities (MRO, RF, and SERC), but MRO is responsible for coordinating data and information submitted for NERC's reliability assessments.

- MISO expects limited risk in the 2025–26 Winter season as MISO was able to procure 6.1% more resources through the annual planning reserve auction than required by its minimum resource adequacy target. A further 3.3 GW of resources were available but not chosen to be committed for the winter season.
- Some risk has been identified for this upcoming winter season. In a high generation outage and high winter load scenario reliability is expected to be maintained by reliance upon operational mitigations that include non-firm energy transfers into the system, energy-only resources not subject to a must-offer requirement that may still offer into the energy markets, load-modifying resources, and internal transfers that exceed the Sub-Regional Import/Export Constraint (SRIC/SREC) between the MISO North/Central and South areas.
- MISO continues to coordinate with neighboring RCs and BAs to improve situational awareness and vet any needs for energy transfers to address extreme system conditions.
- MISO continues to survey and coordinate with its members on winter preparedness and fuel sufficiency.
- MISO has implemented a seasonal resource adequacy construct and seasonal unit accreditation to better affirm adequate supply in all seasons.

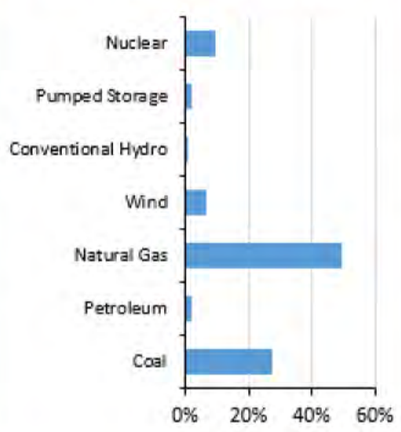
On-Peak Reserve Margin[10]



Risk Scenario Summary

Expected resources meet operating reserve requirements under assessed demand scenarios. Above-normal winter peak load combined with generator outages from freezing or fuel supply issues and low wind output result in the need to employ operating mitigations (i.e., demand response and transfers).

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: 50/50 net internal demand and additional demand during extreme weather conditions (e.g., Winter Storm Enzo) using member submitted data and historical load data

Typical Maintenance Outages: Rolling three-year winter average of peak-day maintenance and planned outages

Typical Forced Outages: Three-year average of all peak-day outages that were not planned

Resource Derates for Extreme Conditions: Represents derates aligning with the most extreme hour of each of the past 3 years,

Operational Mitigations: Non-firm energy transfers into the system, energy-only resources that do not have a must-offer requirement, or internal transfers that exceed the SRIC/SREC between the MISO North/Central and South regions

[10] The MISO Risk Scenario Assessment for the 2025-26 Winter Season is not directly comparable to that for the 2024-25 Winter Season as methodology improvements have been implemented.



MRO-Manitoba Hydro

Manitoba Hydro is a provincial Crown corporation and one of the largest integrated electricity and natural gas distribution utilities in Canada. Manitoba Hydro is a leader in providing renewable energy and clean-burning natural gas. Manitoba Hydro provides electricity to approximately 608,500 electric customers in Manitoba and natural gas to approximately 293,000 customers in southern Manitoba. Its service area is the province of Manitoba, which is 251,000 square miles. Manitoba Hydro is winter-peaking. Manitoba Hydro is its own Planning Coordinator (PC) and Balancing Authority (BA). Manitoba Hydro is a coordinating member of MISO, which is the RC for Manitoba Hydro.

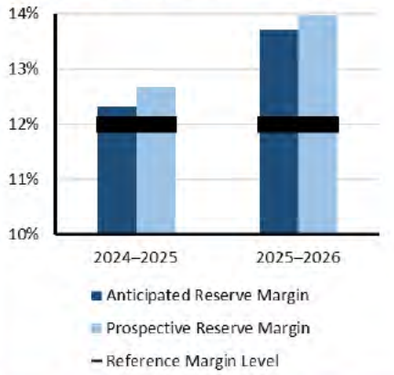
Highlights

- Manitoba Hydro is not anticipating any operational challenges and/or emerging reliability issues in its assessment area for Winter 2025–2026.
- Manitoba Hydro expects to reliably supply its internal demand and export obligations even under continued drought conditions.
- Manitoba Hydro is experiencing well below-average water supply conditions; however, the Manitoba Hydro system is designed and operated such that reliable operations can be maintained under extreme drought.
- The ARM for Winter 2025–26 exceeds the 12% RML.

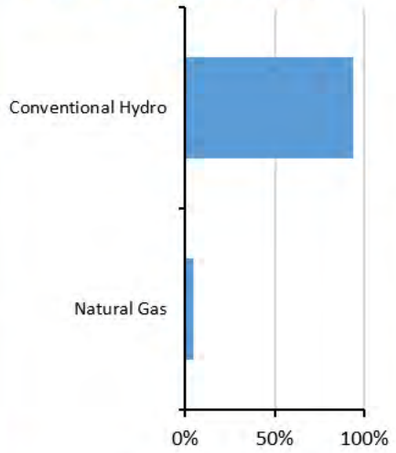
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed scenarios.

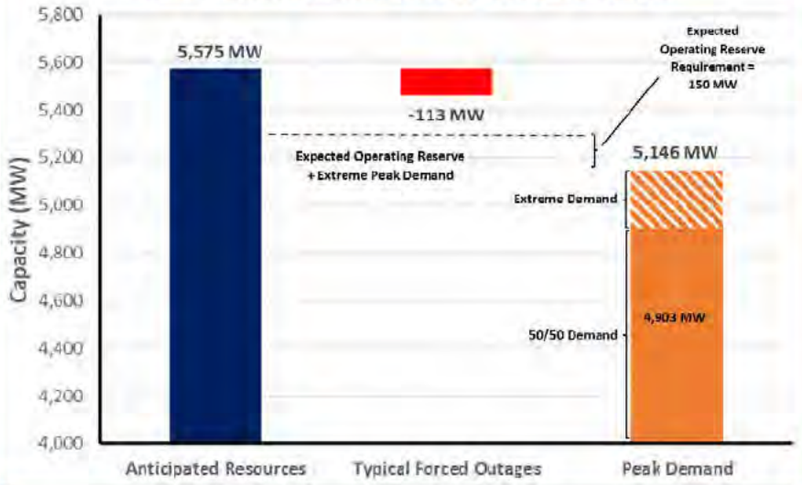
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Net internal demand (50/50) and (90/10) demand forecast using 30 years of weather data

Typical Forced Outages: Accounts for average forced outages



MRO-SaskPower

MRO-SaskPower is an assessment area that covers the Canadian province of Saskatchewan. The province has a geographic area of 651,900 square kilometers (251,700 square miles) and a population of just over 1.1 million people. The Saskatchewan Power Corporation (SaskPower) is the PC and RC for the province of Saskatchewan and is the principal supplier of electricity in the province. SaskPower is a provincial Crown corporation and, under provincial legislation, is responsible for the reliability oversight of the Saskatchewan Bulk Electric System (BES) and its interconnections. Overall, SaskPower operates nearly 14,816 circuit-km of transmission lines, 65 high-voltage switching stations, and 191 distribution substations. Peak electricity demand on the SaskPower system currently occurs during the winter season.

Highlights

- Saskatchewan experiences its peak load during the winter months due to extreme cold weather.
- Based on the planned maintenance, typical forced outages from historical data, and expected renewable generation under the normal and extreme demand conditions, SaskPower does not anticipate any reliability issues during the 2025–2026 Winter.
- During extreme winter conditions, SaskPower would utilize available demand-response programs, short-term power transfers from neighboring utilities, maintenance rescheduling, and/or short-term load interruptions to manage the situation.

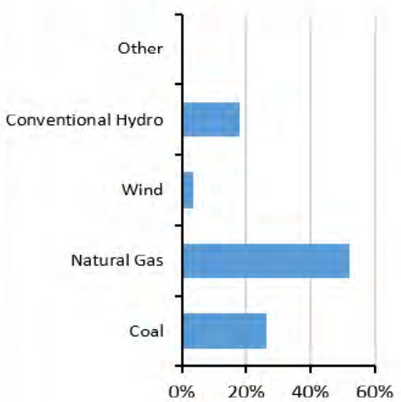
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed scenarios.

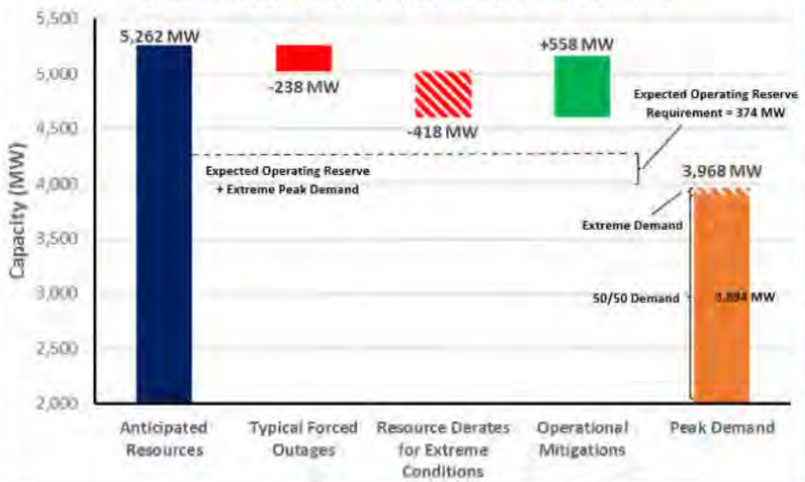
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Based on the historical load variability, SaskPower calculates a probability density function for load to simulate various scenarios that include extreme conditions.

Typical Forced Outages: Estimated using SaskPower forced outage model

Resource Derates for Extreme Conditions: Wind capacity is derated by 96% due to the cut-out of most wind farms below -30°C. Solar generation is expected to be fully unavailable under extreme conditions.

Operational Mitigations: Includes the non-firm import capability (360 MW) and generators in layup status (167 MW) that can be brought online with one to five days' notice; additional demand-side resources are estimated based on other demand response programs and non-firm loads that require 15 minutes to 2 hours of notification



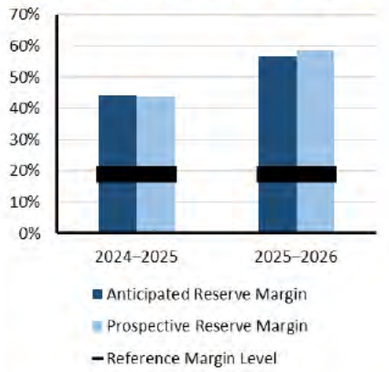
MRO-SPP

SPP's footprint covers 546,000 square miles and encompasses all or parts of Arkansas, Iowa, Kansas, Louisiana, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming. The SPP long-term assessment is reported based on the PC footprint, which touches parts of the MRO Regional Entity and the WECC Regional Entity. The SPP assessment area footprint has approximately 61,000 miles of transmission lines, 756 generating plants, and 4,811 transmission-class substations, and it serves a population of more than 18 million.

Highlights

- SPP anticipates that planning reserves are adequate for the upcoming winter season even as SPP continues to set new winter season load records.
- SPP does not anticipate any emerging reliability issues impacting the area for the 2025–2026 Winter season but realizes that interruptions to fuel supply combined with higher penetration of variable energy resources could create unique operation challenges.
- SPP continues to work at enhancing communications and operator preparedness with neighboring regions to address potential electric deliverability issues associated with extreme weather events.
- To minimize conservative operations, EEAs, and mid-range forecast error uncertainty response in wind forecasts, SPP implemented several new operational mitigation processes and procedures to deal with high-impact real-time areas of reliability concern.
- SPP has proposed numerous resource adequacy initiatives, including addressing EUE standards, fuel assurance, winter planning reserve margins, outage policies, demand response, and accreditation; all were recently approved by FERC.

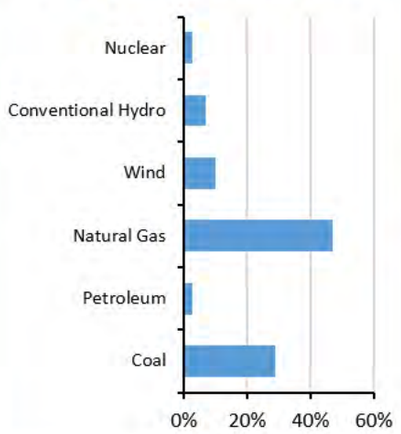
On-Peak Reserve Margin



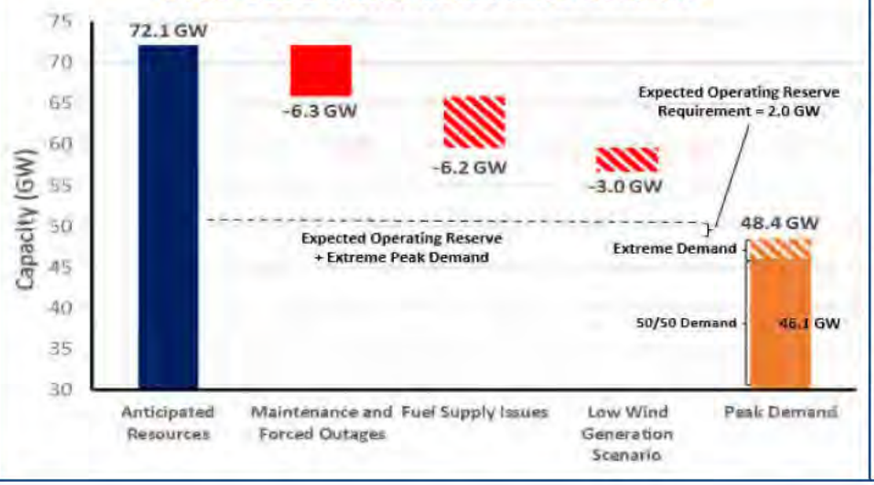
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed scenarios.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Net internal demand (50/50) and extreme demand forecast using historical data

Maintenance and Forced Outages: A capacity derate of 6.3 GW for maintenance outages, forced outages, and performance in extreme weather based on historical data

Fuel Supply Issues: BA derate of 6.2 GW based on MW capacity of gas-fired generators experiencing fuel supply issues in winter storm Elliott.

Low Wind Generation Scenario: 3 GW of wind potentially off-line when temperatures fall below their cold weather performance packages



NPCC-Maritimes

NPCC-Maritimes is an assessment area that covers the Canadian Maritime provinces—New Brunswick, Nova Scotia, and Prince Edward Island—and the northernmost portion of the U.S. state of Maine. The area covers approximately 150,000 square kilometers (58,000 square miles) and has a total population of nearly 1.9 million people. The New Brunswick Power Corporation (NB Power) is the balancing authority for New Brunswick, Prince Edward Island, and the northern portion of Maine. Nova Scotia Power Inc. (NSPI) is the balancing authority for Nova Scotia. NB Power's system is electrically interconnected with NPCC-Québec and NPCC-New England, and the electric systems in the provinces of Nova Scotia and Prince Edward Island have ties with New Brunswick but no direct ties with other assessment areas. Peak electricity demand in NPCC-Maritimes occurs during the winter season.

Highlights

- The Maritimes has a diversified mix of capacity resources fueled by oil, coal, hydro, nuclear, natural gas, wind, dual-fuel oil/gas, tie benefits, and biomass with no one type making up more than about 27% of the total capacity in the area.
- The Maritimes has long-term energy contracts in place for its winter supply and can purchase additional energy in the day-ahead and in real time as required.
- As part of the winter planning and preparation process, dual-fueled units will have sufficient supplies of heavy fuel oil stored on site to enable sustained operation in the event of natural gas supply interruptions.

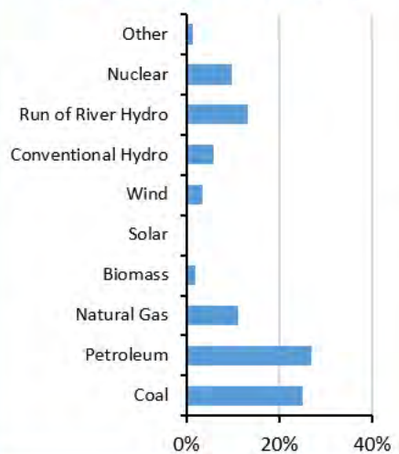
Risk Scenario Summary

Expected resources do not meet operating reserve requirements under normal peak-demand scenarios. Normal winter peak load and outage conditions could result in the need for operating mitigations (i.e., demand response, transfers, appeals) and EEAs. NPCC probabilistic analysis indicates some risk of unserved energy and LOLH under high demand or low resource scenarios.

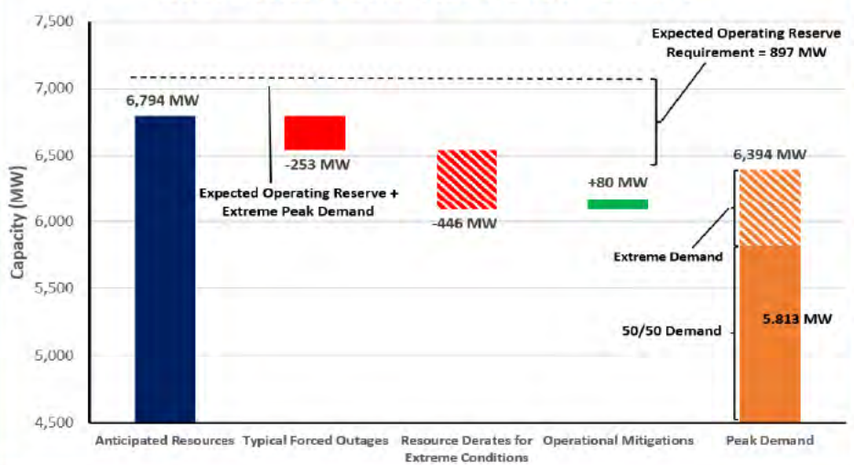
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Scenario peak load with adjustment calculated by adding a 10% margin of error to the peak internal demand forecast taken from the *Long-Term Reliability Assessment* (LTRA) for the 2025–2026 Winter period (aligns with the all-time winter peak, which occurred on February 4, 2024)

Typical Forced Outages: Based on historical operating experience

Resource Derates for Extreme Conditions: Based on ambient temperature thermal derates, wind derated to zero, as well as natural gas capacity derated by 50% due to supply issues

Operational Mitigations: Based on emergency operations and planning procedures in place including fuel switching



NPCC-New England

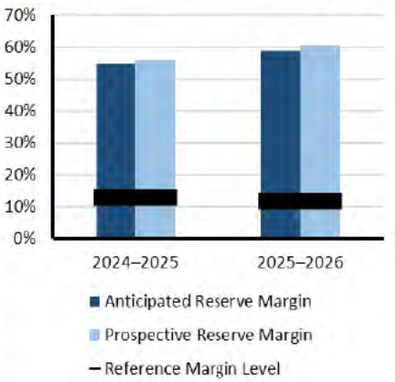
NPCC-New England is an assessment area consisting of the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont that is served by ISO New England (ISO-NE) Inc. ISO-NE is a regional transmission organization that is responsible for the reliable day-to-day operation of New England's bulk power generation and transmission system, administration of the area's wholesale electricity markets, and management of the comprehensive planning of the regional BPS.

The New England BPS serves approximately 14.5 million customers over 68,000 square miles.

Highlights

- ISO-NE expects to meet its regional resource adequacy requirements this 2025–2026 Winter operating period without calling upon operating procedures to maintain a balance between electricity supply and demand.
- A standing concern is whether there will be sufficient energy available to satisfy electricity demand during an extended cold spell given the existing resource mix, fuel delivery infrastructure, and expected fuel arrangements without considerable effort to replenish stored fuels (i.e., fuel oil and liquefied natural gas (LNG)).
- ISO-NE expects to have sufficient capacity resources to meet the 2025–2026 50/50 and 90/10 winter peak demand forecast of 19,616 MW and 21,125 MW, respectively, for the weeks beginning January 10, January 17, and January 24.
- ISO-NE has recently developed the Regional Energy Shortfall Threshold (REST) as an effort to quantify the tolerable risk of energy shortfall during extreme events. Within the 0.25% highest-risk scenarios, the REST thresholds are 3.0% normalized EUE over 72-hour periods and 18.0 hours over 21-day periods.
  - ISO-NE does not anticipate exceeding the REST criteria for Winter 2025–2026.

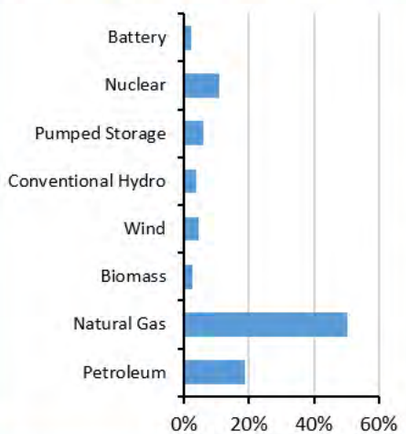
On-Peak Reserve Margin



Risk Scenario Summary

Expected resources meet operating reserve requirements under assessed demand scenarios. Above-normal winter peak load combined with high generator outages could result in the need for operating mitigations (i.e., demand response and transfers). Prolonged extreme cold weather events that result in depletion of stored fuels can lead to resource shortfalls.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

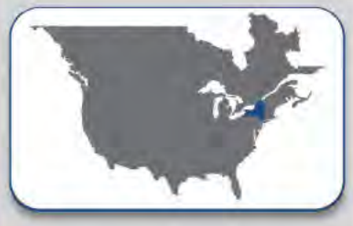
Demand Scenarios: Peak net internal demand (50/50) and (90/10) extreme demand forecast capturing the region's coldest day in the last 30 years using current and future load models

Typical Maintenance Outages: Based on historical weekly averages

Typical Forced Outages: Based on seasonal capacity of each resource as determined by ISO-NE

Resource Derates for Extreme Conditions: Represent a case that is beyond the (90/10) conditions based on historical observation of force outages and additional reductions for generation at risk due to natural gas supply and cold weather-related outages

Operational Mitigations: Based on load and capacity relief assumed available from invocation of ISO-NE operating procedures



NPCC-New York

NPCC-New York is an assessment area consisting of the New York ISO (NYISO) service territory. NYISO is responsible for operating New York's BPS, administering wholesale electricity markets, and conducting system planning. NYISO is the only BA within the state of New York. The BPS in New York encompasses over 11,000 miles of transmission lines and 760 power generation units and serves 20.2 million customers. For this WRA, the established RML is 15%. Wind, grid-connected solar PV, and run-of-river totals were derated for this calculation. However, New York requires load-serving entities to procure capacity for their loads equal to their peak demand plus an Installed Reserve Margin (IRM). The IRM requirement represents a percentage of capacity above peak load forecast and is approved annually by the New York State Reliability Council. The council approved the 2025–2026 IRM at 24.4%.

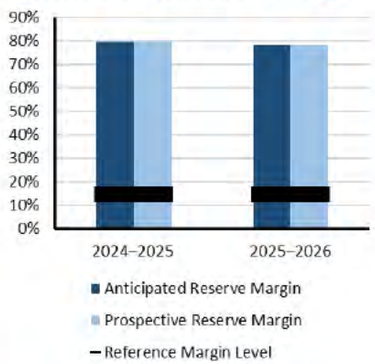
Highlights

- New York is presently a summer-peaking area, and no emerging reliability issues are anticipated during the 2025–26 Winter assessment period.
- Expected resources meet operating reserve requirements under the assessed demand and resource scenarios. A scenario involving an extended cold snap that causes above-normal demand and diminished natural gas supplies would result in low but sufficient reserves.
- The preliminary results of the NPPCC winter probabilistic assessment indicate that operating procedures are not needed to maintain a balance between electricity supply and demand. No cumulative LOLE, LOL,H or EUE risks were indicated over the December–February winter period for all the scenarios modeled.

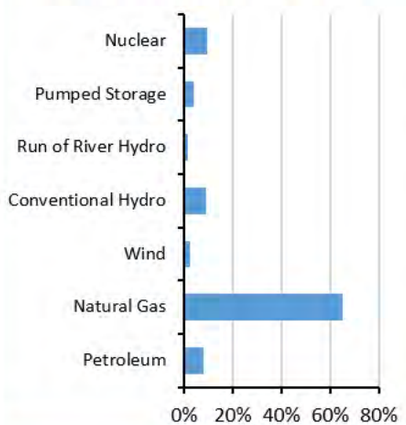
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed demand and resource scenarios.

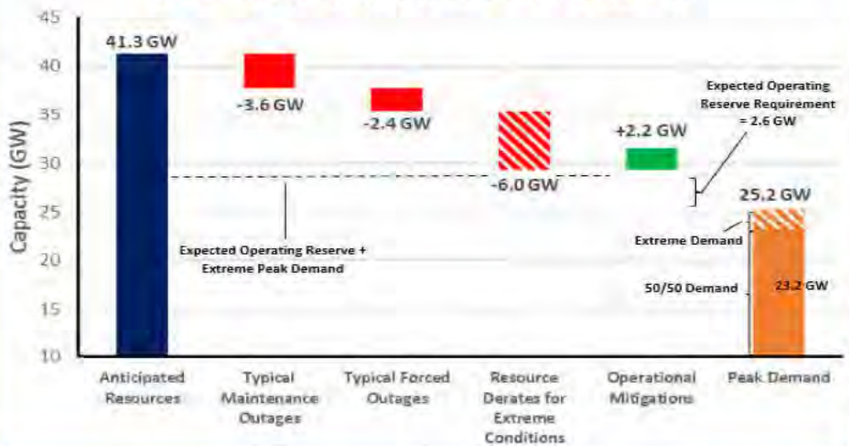
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Net internal demand (50/50) and (90/10) demand forecast

Typical Maintenance Outages: Based on planned scheduled maintenance

Typical Forced Outages: Based on 5–year averages from GADS data.

Resource Derates for Extreme Conditions: Potential natural gas generation at risk if non-firm supply is unavailable in a period of extended cold weather. Based on a 2025 analysis, approximately 6,307 MW of gas generation with non-firm fuel supplies could be unavailable.

Operational Mitigations: Based on NYISO operating procedures



NPCC-Ontario

NPCC-Ontario is an assessment area that covers the Canadian province of Ontario. The province of Ontario covers more than 1 million square kilometers (415,000 square miles) and has a population of almost 16 million people. The Independent Electricity System Operator (IESO) is the balancing authority for the province of Ontario. NPCC-Ontario is electrically interconnected with NPCC-Québec, MRO-Manitoba, MISO, and NPCC-New York. Peak electricity demand in NPCC-Ontario occurs during the summer season.

Highlights

- As Ontario is a summer-peaking province, there is typically a lower risk of reliability issues during the winter than the summer. However, Ontario regularly experiences extreme cold weather in the winter.
- NPCC-Ontario is well prepared for Winter 2025–2026, and IESO expects that the electric system will remain reliable with reserve margins well above required levels.
- Operators and forecasters in Ontario work closely with neighboring jurisdictions to manage extreme weather events.
- Natural-gas-fired generators in Ontario are supplied by pipelines with access to the Enbridge Gas Dawn Hub and its associated storage facilities, which significantly reduces natural gas deliverability and reliability concerns by connecting those systems to several major gas transportation corridors, enabling access to multiple supply basins.

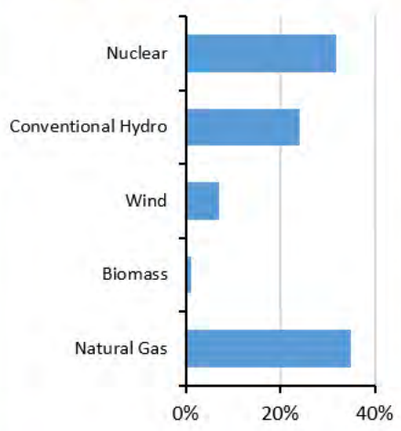
On-Peak Reserve Margin



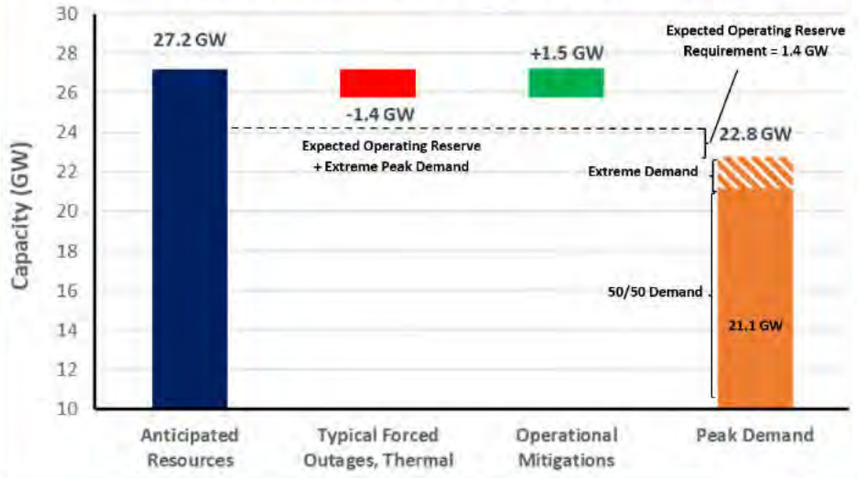
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed scenarios.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Net internal demand (50/50 forecast) and highest weather-adjusted daily demand from 31 years of winter demand history

Typical Forced Outages, Thermal: Based on analysis of a rolling five-year history of actual forced outage data.

Operational Mitigations: Imports anticipated from **neighbors** during emergencies



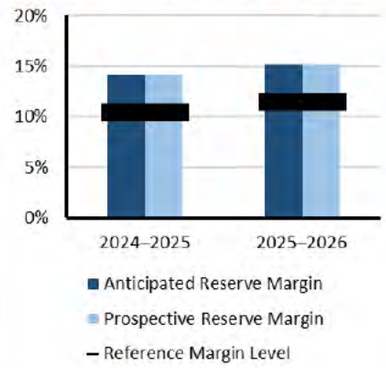
NPCC-Québec

NPCC-Québec is an assessment area that covers the Canadian province of Québec. The province of Québec covers over 1.5 million square kilometers (nearly 600,000 square miles) and has a population of 9 million people. Hydro-Québec is the BA for the province of Québec. The Québec BPS is one of the four electric Interconnections in North America. It is a predominately hydroelectric-generation-based system that is electrically interconnected with NPCC-Ontario, NPCC-New York, NPCC-New England, and NPCC-Maritimes. Peak electricity demand in NPCC-Québec occurs during the winter season.

Highlights

- NPCC-Québec projects adequate capacity margins above its reference reserve requirements and that system resource adequacy will be maintained for the province for the 2025–26 Winter assessment period.
- No hydropower performance issues are expected during extreme cold because of design criteria for cold weather.
- No fuel supply or transportation issues are anticipated for the upcoming winter season.
- While a slight decrease in net firm transfers has occurred since last winter (-89 MW), significant increases in demand-side management programs (+450 MW year-over-year) have been realized over the same period and are expected to compensate for this winter's modest expected load growth.

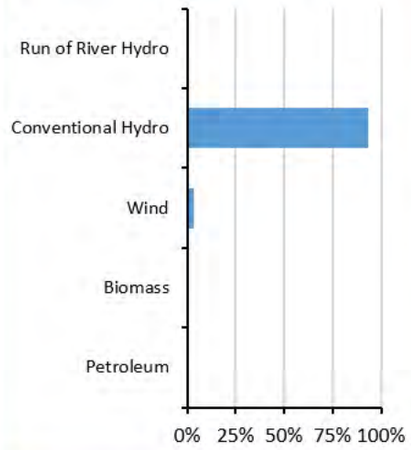
On-Peak Reserve Margin



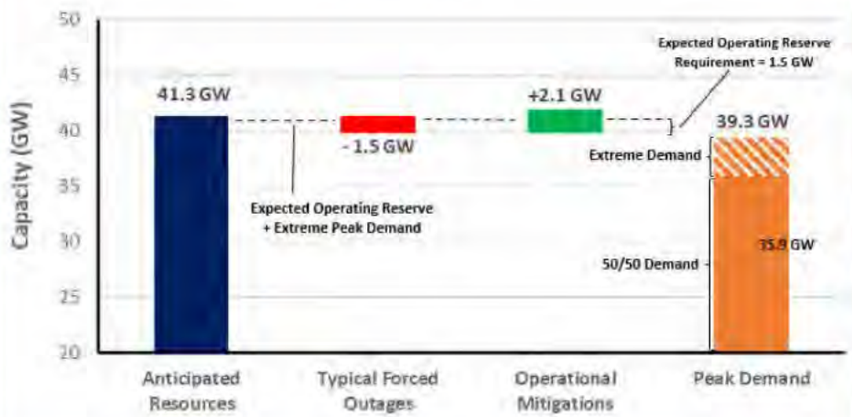
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed scenarios.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

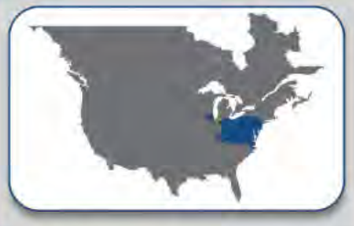
Risk Period: Highest risk for unserved energy at hour ending 8:00 a.m.

Demand Scenarios: Demand forecasts include demand-side resources. The demand side resources are the same for the 50/50 and extreme demand scenarios. The extreme load forecast is determined at two standard deviations higher than the mean, which has a 6.06% probability of occurrence.

Extreme Derates: Maintenance outages and other deratings are already included in existing-certain capacity calculation. Wind capacity is 64% derated

Typical Forced Outages: Unplanned outages are 1,500 MW.

Operational Mitigations: Operational mitigations include imports from neighboring areas and reduction of reserves



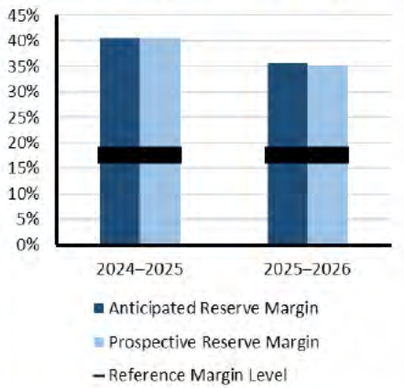
PJM

PJM Interconnection is a regional transmission organization that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia. PJM's footprint covers approximately 369,054 square miles and with an approximate population of 67 million people. PJM is the area's BA, Transmission and Resource Planner, interchange authority, TOP, transmission service provider, and RC. PJM is electrically interconnected with MISO, NPCC-New York, SERC-Central, and SERC-East. Peak electricity demand in PJM occurs during the summer season.

Highlights

- Due to the low penetration of limited and variable resources in PJM relative to PJM's peak load, the hour with highest loss-of-load risk remains the hour with highest forecasted demand.
- PJM is expecting little capacity adequacy risk during Winter 2025–2026 and expects around 35% installed reserves, which is above the target IRM of 17.7% necessary to meet the 1-day-in-10-years LOLE criterion.
- Last winter, PJM hit a new all-time winter peak, but generator preparations anticipating congestion and tight capacity projections led to sufficient reserves throughout the demand event and PJM's transmission system performed well.
- The decrease in reserves from Winter 2024–2025 is due to load increases and retirement of generation without like (non-solar dispatchable) replacement generation.

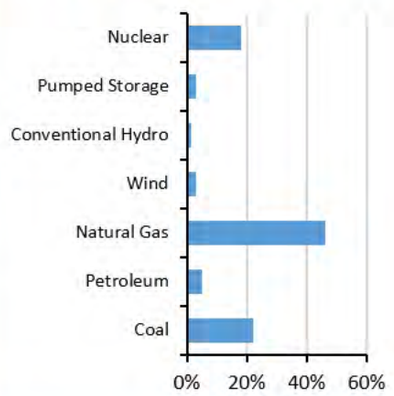
On-Peak Reserve Margin



Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed scenarios.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Net internal demand (50/50) and (90/10) demand forecast

Typical Forced Outages: Based on historical data and trending

Resource Derates for Extreme Conditions: Reduced thermal capacity contributions due to performance in extreme conditions

Operational Mitigations: accounts for an estimated value based on operational / emergency procedures



SERC-Central

SERC-Central is an assessment area within the SERC Regional Entity. SERC-Central includes all of Tennessee and portions of Georgia, Alabama, Mississippi, Missouri, and Kentucky. Historically a summer-peaking area, SERC-Central is beginning to have higher peak demand forecasts in winter. SERC is one of the six companies across North America that are responsible for the work under FERC-approved delegation agreements with NERC. SERC-Central is specifically responsible for the reliability and security of the electric grid across the Southeastern and Central areas of the United States. This area covers approximately 630,000 square miles and serves a population of more than 91 million. The SERC Regional Entity includes 36 BAs, 28 planning entities, and 6 RCs.

Highlights

- SERC-Central is transitioning from a summer-peaking area to a dual-peaking system.
- For the 2025–2026 Winter, SERC-Central projects a sufficient level of resources to serve the expected load under median weather and typical system operating conditions, based on the 2024 NERC ProbA base-case results.
- Most entities across SERC-Central report that fuel security is strong since it is supported by firm natural gas contracts, storage resources, and reliable pipeline capacity. Coal inventories are projected to remain within operational ranges necessary to meet winter demand.
- Following lessons from Winter Storm Elliott, one SERC-Central entity raised its winter Planning Reserve Margin target to 26% and updated preparedness programs with improved heat trace capabilities.

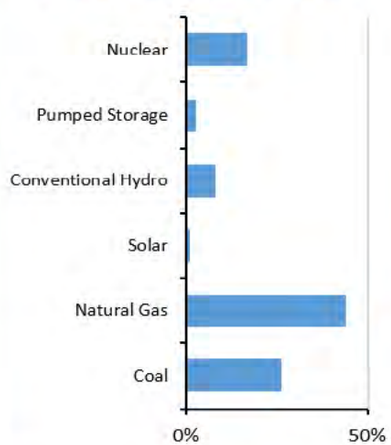
Risk Scenario Summary

Expected resources meet operating reserve requirements under normal peak demand. A severe cold weather event that extends to the south could lead to energy emergencies as operators face sharp increases in generator forced outages and electricity demand. Above-normal winter peak load and outage conditions could result in the need for operating mitigations (i.e., demand response and transfers) and EEAs. Load shedding is unlikely but may be needed under wide-area cold weather events.

On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

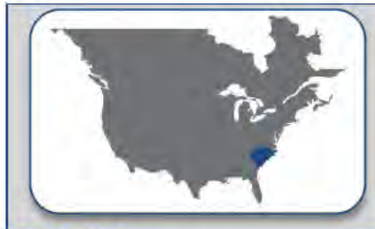
Demand Scenarios: Net internal demand (50/50) and (90/10) demand forecast using 30 years of historical data

Typical Maintenance Outages: Data collected through a survey of members for expected outages during December through February

Typical Forced Outages and Solar Derate: Includes any weighted average forced-outage rates on-peak that are not factored into the anticipated resources calculation . Also, solar resources are derated to account for peak demand occurrence during darkness.

Resource Derates for Extreme Conditions: Entity-provided values for low likelihood extreme conditions

Operational Mitigations: A total of over 1.6 GW based on operational/emergency procedures



SERC-East

SERC-East is an assessment area within the SERC Regional Entity. SERC-East includes North Carolina and South Carolina. Historically a summer-peaking area, SERC-East is beginning to have higher peak demand forecasts in winter. SERC is one of the six Regional Entities across North America that are responsible for the work under FERC-approved delegation agreements with NERC. SERC is specifically responsible for the reliability and security of the electric grid across the Southeastern and Central United States. The SERC Regional Entity covers approximately 630,000 square miles with a population of more than 91 million. The SERC Regional Entity includes 36 BAs, 28 Planning Authorities (PA), and 6 RCs.

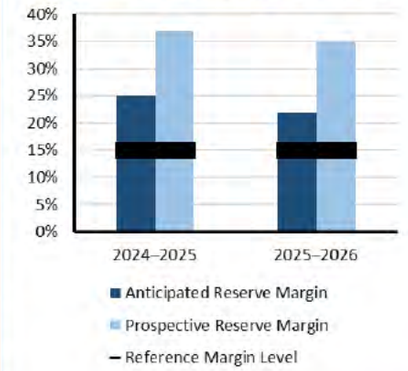
Highlights

- SERC-East is transitioning from a summer-peaking area to potentially peaking during both summer and winter. This shift is attributed to the continued addition of solar PV generation, which reduces summer peak demand, and a trend toward electrification of heating, which drives up winter peak demand.
- For the 2025–2026 Winter, the SERC-East region projects a sufficient level of resources to serve the expected load under median weather and typical system operating conditions, based on the 2024 NERC ProbA base-case results.
- Fuel supplies and transportation remain stable, and entities anticipate maintaining adequate coal and oil inventories with no reported changes to fuel procurement or operator plans for the upcoming winter.
- Probabilistic Base Case Results (Median Weather): EUE is 61.95 MWh and LOLH is 0.06 hours/year. EUE values are likely due to higher winter peaks and/or lower supply of capacity that can meet early winter morning demand.
- Mitigation measures for extreme conditions include voltage reduction (25–50 MW) and load-shedding programs that cover up to 30% of system load.

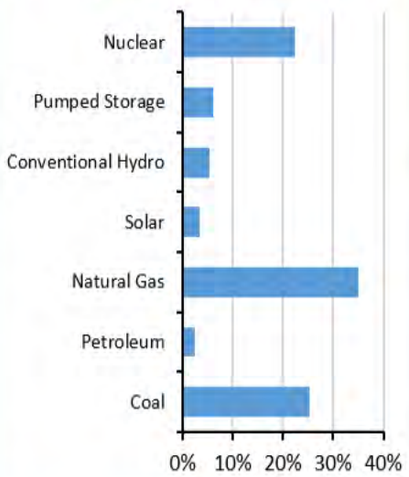
Risk Scenario Summary

Expected resources meet operating reserve requirements under normal demand scenarios. A severe cold weather event extending to the south could lead to energy emergencies as operators face sharp increases in generator forced outages and electricity demand. Above-normal winter peak load and outage conditions could result in the need for operating mitigations (i.e., demand response and transfers) and EEAs. Load shedding is unlikely but may be needed under wide-area cold weather events.

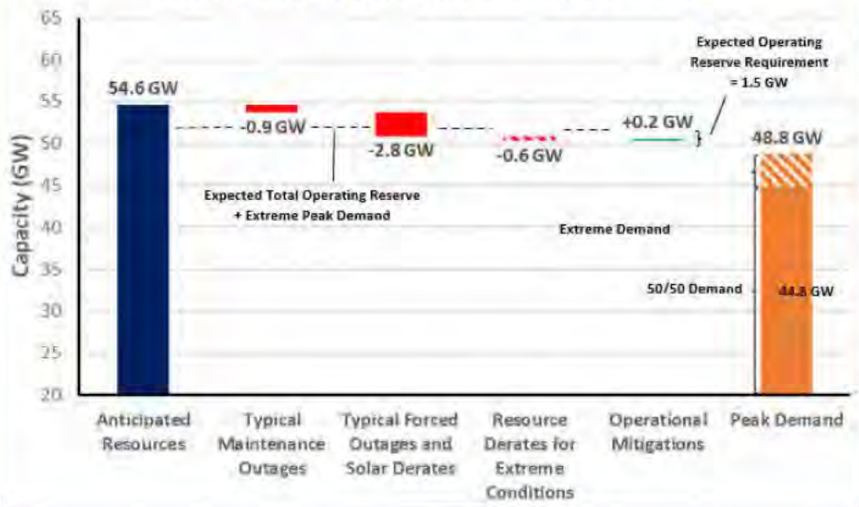
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Net internal demand (50/50) and (90/10) demand forecast

Typical Maintenance Outages: Data collected through a survey of members for outages during December through February

Typical Forced Outages and Solar Derate: Weighted average forced-outage rates on-peak are factored into the anticipated resources calculation. Also, solar resources are derated to account for peak demand occurrence during darkness.

Resource Derates for Extreme Conditions: Maximum historical generation outages (excluding 2022–2025)

Operational Mitigations: A total of 0.2 GW based on operational/emergency procedures



SERC-Florida Peninsula

SERC-Florida Peninsula is a summer-peaking assessment area within SERC. SERC is one of the six Regional Entities across North America that is responsible for the work under FERC-approved delegation agreements with NERC. SERC is specifically responsible for the reliability and security of the electric grid across the Southeastern and Central United States. The SERC Regional Entity area covers approximately 630,000 square miles with a population of more than 91 million. The SERC Regional Entity includes 36 BAs, 28 PAs, and 6 RCs.

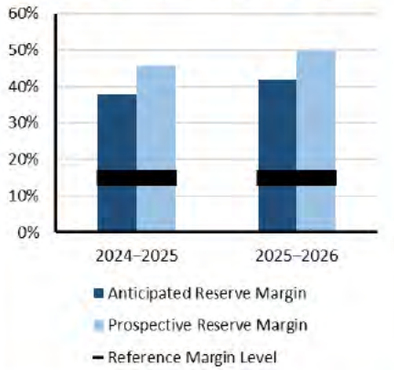
Highlights

- SERC-Florida Peninsula is a summer-peaking assessment area.
- Florida Peninsula entities have not identified any emerging reliability issues for the upcoming 2025–26 Winter season with an ARM projected at 39%, well above the RML, while the 2024 NERC ProbA base-case results project a sufficient level of resources to serve the expected load under median weather and typical system operating conditions (EUE is 1.09 MWh and LOLH is 0.00 hours/year).
- Many entities report strong fuel security, supported by firm natural gas contracts, storage resources, reliable pipeline capacity, and actively managed coal and oil inventories, which are projected to remain within operational ranges to meet winter demand.
- Florida Peninsula entities do not assume non-firm external assistance from neighboring areas during extreme conditions.

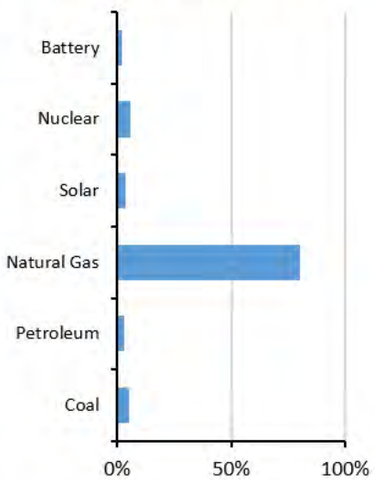
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed scenarios.

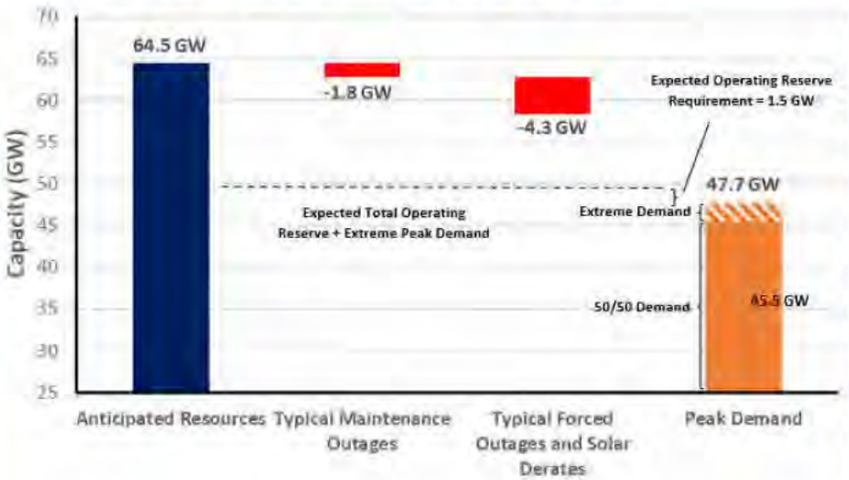
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

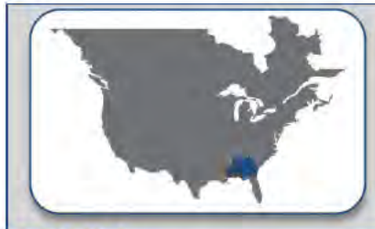
Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Net internal demand (50/50) and (90/10) demand forecast using 30 years of historical data

Typical Maintenance Outages: Data collected through a survey of members for outages during December through February

Typical Forced Outages and Solar Derate: Weighted average forced-outage rates on-peak are factored into the anticipated resources calculation. Also, solar resources are derated to account for peak demand occurrence during darkness.

Resource Derates for Extreme Conditions: Entity-provided values for low likelihood extreme conditions



SERC-Southeast

SERC-Southeast is a summer-peaking assessment area within the SERC Regional Entity. SERC-Southeast includes all or portions of Georgia, Alabama, and Mississippi. SERC is one of the six Regional Entities across North America that is responsible for the work under FERC-approved delegation agreements with NERC. SERC is specifically responsible for the reliability and security of the electric grid across the Southeastern and Central United States. The SERC Regional Entity covers approximately 630,000 square miles with a population of more than 91 million. The SERC Regional Entity includes 36 BAs, 28 PAs, and 6 RCs.

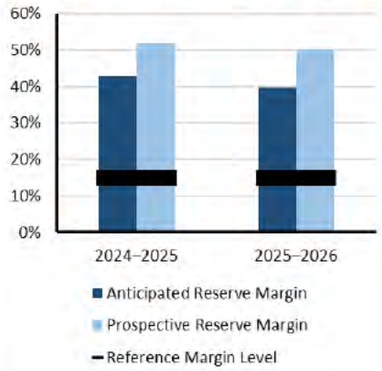
Highlights

- SERC-Southeast is trending towards becoming slightly winter-peaking.
- For the 2025–2026 Winter, SERC-Southeast entities report no emerging reliability concerns and expect to have adequate resources, supported by firm natural gas transportation contracts, diverse fuel portfolios, and sufficient on-site coal inventories to serve the expected load under typical system operating conditions. The 2024 NERC ProbA base-case results in EUE and LOLH are both 0.00.
- While most SERC-Southeast BAs expect to have adequate resources, supported by firm natural gas transportation contracts, diverse fuel portfolios, and sufficient on-site coal inventories, one BA highlights potential risks related to natural gas transportation capacity, citing high pipeline utilization, competition for delivered gas, and ratable flow requirements. Mitigation strategies include securing third-party gas supply, adding dual-fuel capability, and implementing coal inventory management.
- Entities have made refinements such as replacing specific 230 kV circuit breakers and increasing monitoring frequencies for critical plant systems after January 2025 winter events.

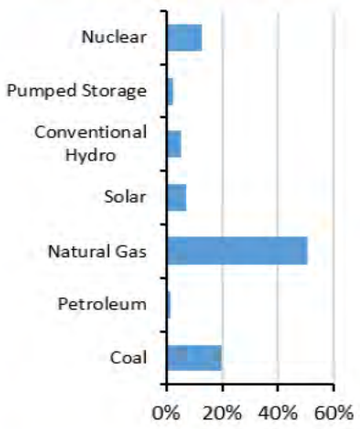
Risk Scenario Summary

Expected resources meet operating reserve requirements under the assessed scenarios.

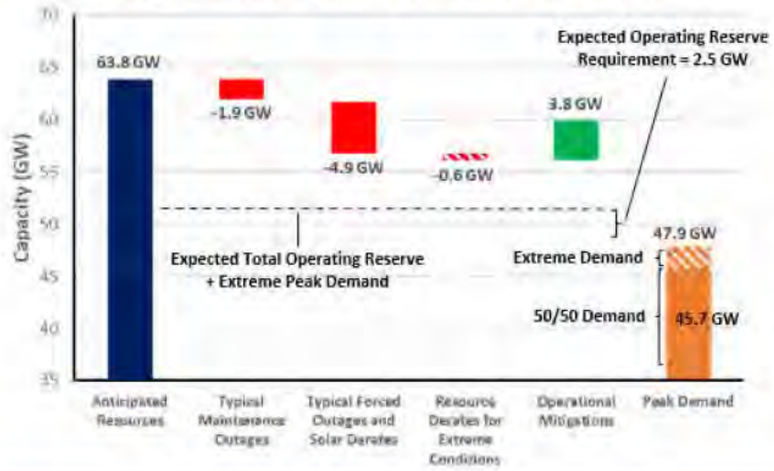
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Net internal demand (50/50) and (90/10) demand forecast using 30 years of historical data

Typical Maintenance Outages: Data collected through a survey of members for outages during December through February

Typical Forced Outages and Solar Derate: Weighted average forced-outage rates on-peak are factored into the anticipated resources calculation. Also, solar resources are derated to account for peak demand occurrence during darkness.

Resource Derates for Extreme Conditions: Maximum historical generation outages

Operational Mitigations: A total of 3.8 GW based on operational/emergency procedures



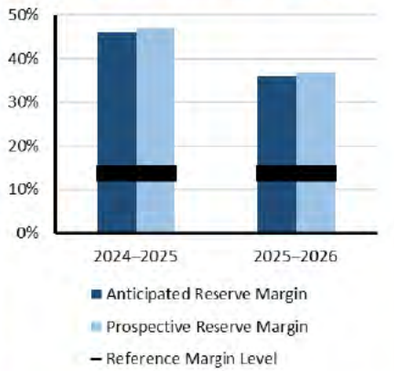
Texas RE-ERCOT

ERCOT is the ISO for the ERCOT Interconnection and is located entirely in the state of Texas; it operates as a single BA. It also performs financial settlement for the competitive wholesale bulk-power market and administers retail switching for nearly 8 million premises in competitive choice areas. ERCOT is governed by a board of directors and subject to oversight by the Public Utility Commission of Texas and the Texas Legislature. ERCOT is summer-peaking and covers approximately 200,000 square miles, connects over 54,100 miles of transmission lines, has over 1,250 generation units, and serves more than 27 million customers. Texas RE is responsible for the Regional Entity functions described in the Energy Policy Act of 2005 for ERCOT. On November 3, 2022, the Public Utility Commission of Texas issued an order directing ERCOT to assume the duties and responsibilities of the reliability monitor for the Texas power grid.

Highlights

- Given expected system conditions, an ARM of 36% and RML of 13.75%, ERCOT expects to have sufficient operating reserves for the peak hour ending 8:00 a.m.
- ERCOT does not expect any significant fuel supply issues for the winter.
- ERCOT has conducted 2,028 generation resource and transmission service provider (TSP) winter weatherization inspections since Winter 2021–2022.
- Winter peak demands typically occur before sunrise and after sunset when solar generation is not available. Significant battery storage mitigates these risks.
- ERCOT's probabilistic risk assessment indicates a 2% probability of having to declare EEAs during the January forecasted winter peak day (which coincides with the highest reserve shortage risk) and a controlled load shed probability of 1.8%. ERCOT defines low-risk hours as when the probability of an EEA is less than 10%.
- Increased load growth in west Texas combined with "no solar" and low wind conditions can cause transmission lines into this area to become heavily loaded. ERCOT has introduced improved dynamic line ratings that allow for greater transfers at colder temperatures and periods of low irradiance.

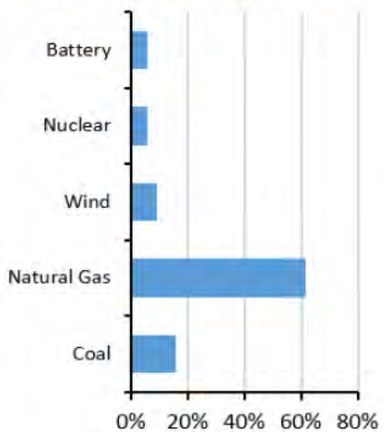
On-Peak Reserve Margin



Risk Scenario Summary

Expected resources meet operating reserve requirements under normal peak-demand scenarios. Above-normal winter peak load and outage conditions could result in the need for operating mitigations (i.e., demand response and transfers) and EEAs. Load shedding is unlikely but may be needed under wide-area cold weather events.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy at peak demand hour

Demand Scenarios: Presumes weather conditions comparable to Winter Storm Uri. The adjustment is calculated as the difference between the 100th percentile and 50th percentile values from ERCOT's Probabilistic Reserve Risk Model (PRRM) simulated load outcome distribution for hour ending 8:00 a.m.

Typical Maintenance Outages: Based on historical winter data and consideration of ERCOT's allowed maximum system daily planned outage capacity

Typical Forced Outages: Based on a probability distribution created using historical ERCOT Outage Scheduler data for the last three Januarys.

Resource Derates for Extreme Conditions: Weather-related thermal and wind outages based on Winter Storm Uri levels, adjusted for reductions due to weatherization standards. Also includes high non-weather-related outages.

Operational Mitigations: Additional potential capacity from switchable generation and imports



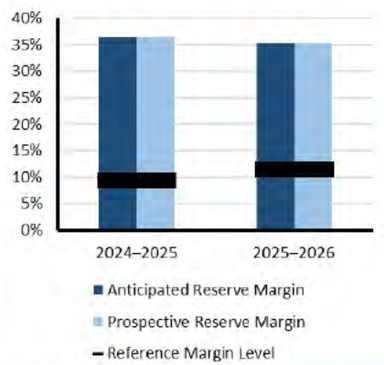
WECC-Alberta

WECC-Alberta is an assessment area that covers the Canadian province of Alberta. The province has a geographic area of 661,848 square kilometers (255,541 square miles) and a population of almost 5 million people. The Alberta Electric System Operator (AESO) is the province's Planning Entity and RC responsible for safe, reliable, and economic operation of the Alberta Interconnected Electric System. AESO is a non-profit corporation that operates a system that includes approximately 26,000 kilometers of transmission lines and connects approximately 426 qualified generating units and nearly 250 market participants through a wholesale market. Alberta's transmission system has three interties with neighboring areas: Saskatchewan (see MRO-SaskPower), British Columbia (see WECC-British Columbia), and Montana (see WECC-Northwest). Peak electricity demand on the AESO system currently occurs during the winter season.

Highlights

- At an extreme winter peak of 12,982 MW, with extreme forced outages at 530 MW and derates for extreme conditions bringing wind energy availability down by 1,800 MW and hydroelectricity by 88 MW, the required reserves are 759 MW and are sufficiently met, even with low availability.
- Demand is expected to increase 1.1% from last winter with the existing-certain installed capacity having increased 23%.
- Solar availability is down because 1,000 MW of PV moved from originally expecting to come on-line in 2024 as Tier 1 resources to Tier 2s mostly anticipated to come on-line in 2025, but with less certainty.

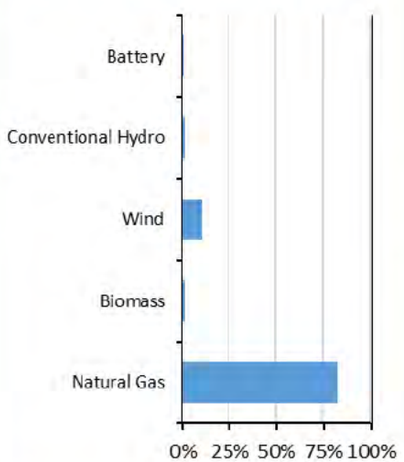
On-Peak Reserve Margin



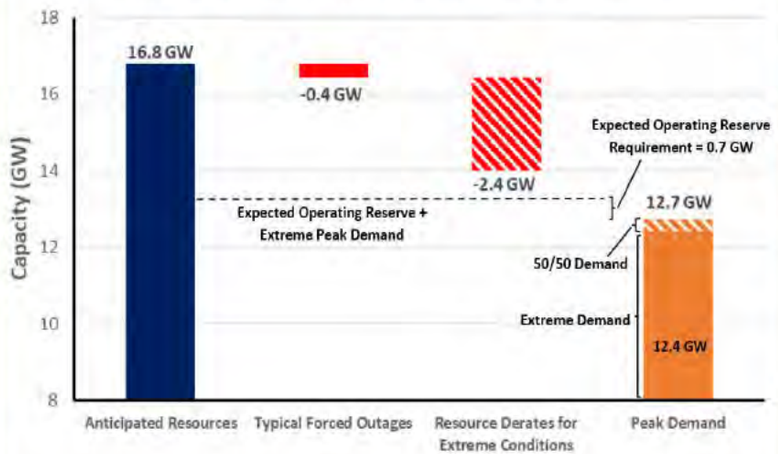
Risk Scenario Summary

Expected resources meet operating reserve requirements under assessed scenarios.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy is on the peak demand hour

Demand Scenarios: Net internal demand is the expected (50th percentile) peak and the 90th percentile of peak demand is the extreme forecast

Typical Forced Outages: Calculated using historical GADS data

Resource Derates for Extreme Conditions: Thermal, wind, and solar are based on the hourly energy availability curves' probability distributions' 10th percentiles for the risk period



WECC-Basin

WECC-Basin is a summer-peaking assessment area in the WECC Regional Entity that includes Utah, southern Idaho, and a portion of western Wyoming, covering Idaho Power and PacifiCorp's eastern BA area. The population of this area is approximately 5.4 million. It has 15,910 miles of transmission. WECC is responsible for coordinating and promoting BES reliability in the Western Interconnection. WECC's 329 members include 40 BAs, representing a wide spectrum of organizations with an interest in the BES. Serving an area of nearly 1.8 million square miles and more than 84.5 million customers, it is geographically the largest and most diverse Regional Entity. *Note: The 2025-26 WRA includes a new assessment area map for the U.S. Western Interconnection. The new assessment area boundaries provide more geographic detail of reliability risk information. WECC-Basin is a new assessment area in 2025 that was part of WECC-NW in the 2024–25 WRA.*

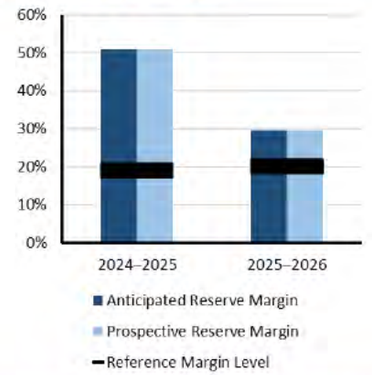
Highlights

- At an extreme winter peak of 11.1 GW under an extreme combination of derates and outages, the region could be short 1.0 GW before imports and is expected to need to rely on transfers.
- Net internal demand is expected to increase 1% since last year, with total internal demand up 1.8% being offset by a doubling of controllable and dispatchable demand response.
- Tier 1 resources have declined and do not appear to be offset by increases in existing-certain generation resource capacity. Nameplate wind has increased by almost 18% and solar by almost 30%. Hydro is also up over 7% in total installed capacity.
- Reliance on imports is expected to be required to maintain resource adequacy during extreme peak demand and extreme derate conditions.

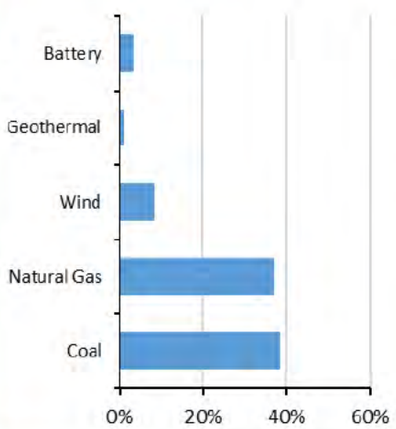
Risk Scenario Summary

Expected resources meet operating reserve requirements under normal peak demand scenarios. Above-normal peak demand combined with high generator outages in extreme conditions results in the need for external assistance to maintain reserves.

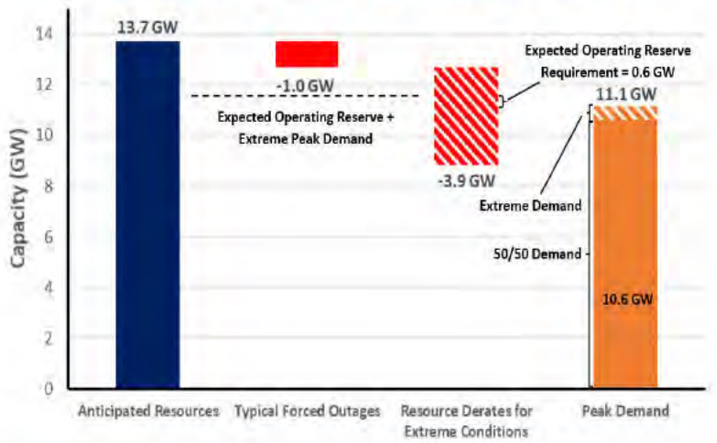
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy is on the peak demand hour

Demand Scenarios: Net internal demand is the expected (50th percentile) peak and the 90th percentile of peak demand is the extreme forecast

Typical Forced Outages: Calculated using historical GADS

Extreme Derates: Thermal, wind, and solar are based on the hourly energy availability curves' probability distributions' 10th percentiles for the risk period



WECC-British Columbia

WECC-British Columbia is an assessment area that covers the Canadian province of British Columbia. The province has a geographic area of 944,735 square kilometers (364,764 square miles) and a population of just over 5 million people. BC Hydro is the Planning Entity and RC for the province of British Columbia and is the principal supplier of electricity for the province. BC Hydro is a provincial Crown corporation and, under provincial legislation, is responsible for the oversight of the British Columbia BES and its interconnections. BC Hydro operates an integrated system supported by 30 hydroelectric plants, approximately 80,000 kilometers of transmission and distribution lines, and 125 contracts with independent power producers. BC Hydro's transmission system has two interties with neighboring areas: the U.S. state of Washington (see WECC-Northwest) and Alberta (see WECC-Alberta). Peak electricity demand on the BC Hydro system currently occurs during winter.

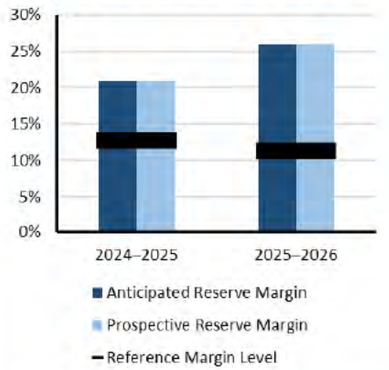
Highlights

- Peak demand is expected to remain about the same as last winter.
- There are about 200 MW more (47%) planned Tier 1 resources for this winter than last.
- Solar nameplate capacity has increased from 2 MW to 17 MW since last winter and hydroelectric nameplate capacity is up more than 5%, or 1,366 MW.

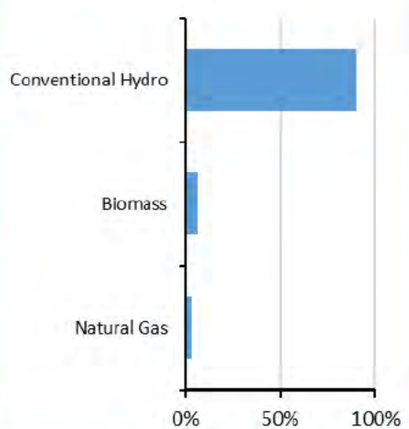
Risk Scenario Summary

Expected resources meet operating reserve requirements under normal and extreme demand scenarios.

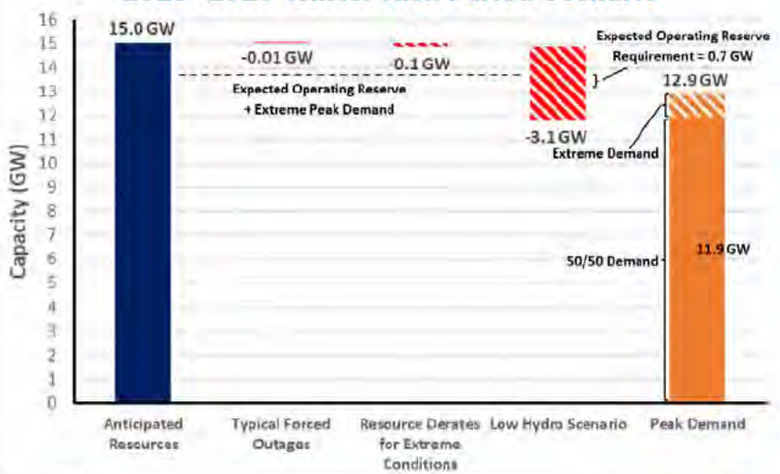
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy is on the peak demand hour

Demand Scenarios: Net internal demand is the expected (50th percentile) peak and the 90th percentile of peak demand is the extreme forecast

Typical Forced Outages: Calculated using historical GADS

Resource Derates for Extreme Conditions: Thermal, wind, and solar are based on the hourly energy availability curves' probability distributions' 10th percentiles for the risk period

Low Hydro Scenario: Estimated derate for lower hydro output



WECC-California

WECC-California is a summer-peaking assessment area in the Western Interconnection that includes most of California and a small section of Nevada. The assessment area has a population of over 42.5 million people. The area includes the California ISO, the Los Angeles Department of Water and Power, the Turlock Irrigation District, and the Balancing Area of Northern California. It has 32,712 miles of transmission. WECC is responsible for coordinating and promoting BES reliability in the Western Interconnection. WECC's 329 members include 40 BAs, representing a wide spectrum of organizations with an interest in the BES. Serving an area of nearly 1.8 million square miles and more than 84.5 million customers, it is geographically the largest and most diverse Regional Entity. *Note: The 2025–26 WRA includes a new assessment area map for the U.S. Western Interconnection. The new assessment area boundaries provide more geographic detail of reliability risk information. WECC-Basin is a new assessment area in 2025 that was part of WECC-NW in the 2024–25 WRA.*

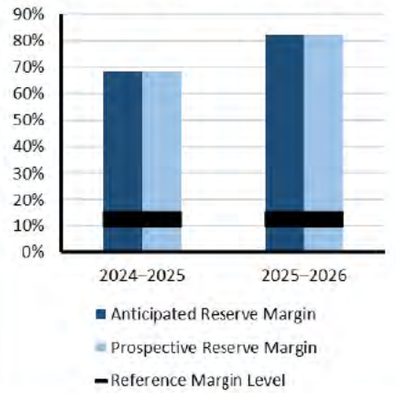
Highlights

- Operating reserve margins are met before imports in all winter resource availability scenarios.
- On-peak demand is expected to remain about the same as last winter. Demand-side management is down about 10%.
- Existing-certain capacity is up almost 5%, while planned Tier 1 resources are up more than 2 GW. The total wind nameplate capacity is up almost 27% and solar almost 13%. Hydro is down 4%.
- No reliance on imports is expected to be required to maintain resource adequacy for Winter 2025–2026.

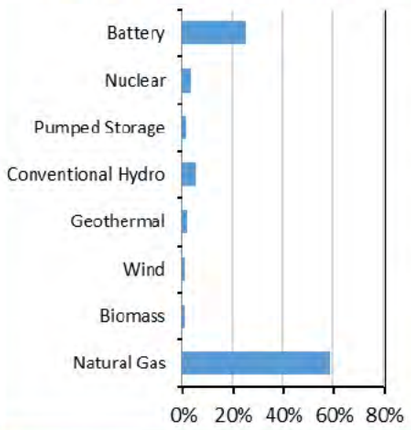
Risk Scenario Summary

Expected resources meet operating reserve requirements under assessed scenarios.

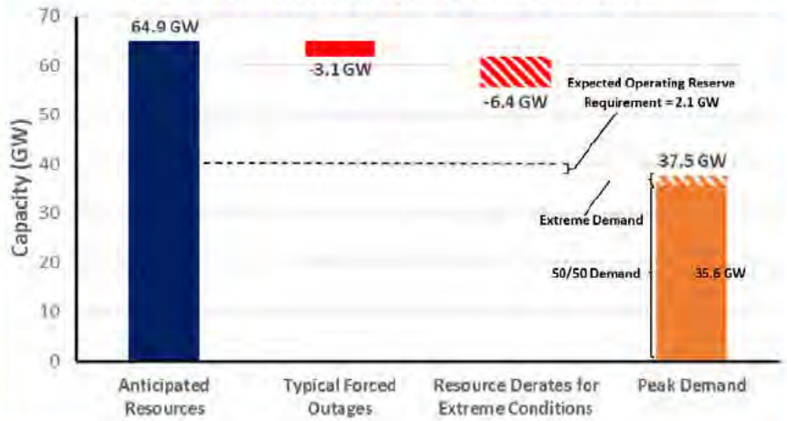
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy is on the peak demand hour

Demand Scenarios: Net internal demand is the expected (50th percentile) peak and the 90th percentile of peak demand is the extreme forecast

Typical Forced Outages: Calculated using historical GADS

Resource Derates for Extreme Conditions: Thermal, wind, and solar are based on the hourly energy availability curves' probability distributions' 10th percentiles for the risk period



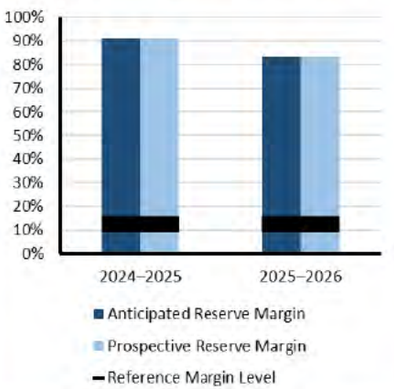
WECC-Mexico

WECC-Mexico is a summer-peaking assessment area in the Western Interconnection that includes the northern portion of the Mexican state of Baja California, which has a population of 3.8 million people and includes CENACE. It has 1,568 miles of transmission. WECC is responsible for coordinating and promoting BES reliability in the Western Interconnection. WECC's 329 members include 40 BAs, representing a wide spectrum of organizations with an interest in the BES. Serving an area of nearly 1.8 million square miles and more than 84.5 million customers, it is geographically the largest and most diverse Regional Entity. *Note: The 2025–26 WRA includes a new assessment area map for the U.S. Western Interconnection. The new assessment area boundaries provide more geographic detail of reliability risk information. WECC-Basin is a new assessment area in 2025 that was part of WECC-NW in the 2024–25 WRA.*

Highlights

- As a summer-peaking region, operating reserve margins are met before imports in all scenarios.
- Planned Tier 1 resources are down 100% to zero as expected resources have either been brought on-line to move into existing or, in the case of some natural gas, have been delayed until 2026 and moved into Tier 2.
- The existing-certain on peak reserve margin is down by 5.2%, and the anticipated and prospective reserve margins are down by 7.8%; however, since Mexico is heavily summer-peaking, the 83% reserve margin still exceeds the RML of 12.5%, which remains unchanged.

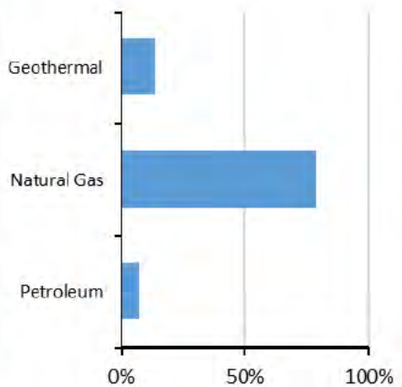
On-Peak Reserve Margin



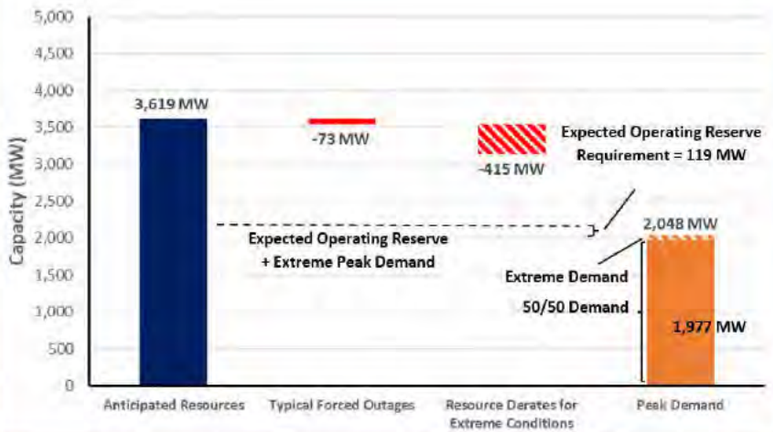
Risk Scenario Summary

Expected resources meet operating reserve requirements under assessed scenarios.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy is on the peak demand hour

Demand Scenarios: Net internal demand is the expected (50th percentile) peak and the 90th percentile of peak demand is the extreme forecast

Typical Forced Outages: Calculated using historical GADS

Resource Derates for Extreme Conditions: Thermal, wind, and solar are based on the hourly energy availability curves' probability distributions' 10th percentiles for the risk period



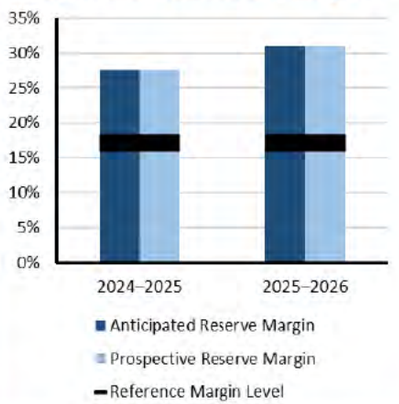
WECC-Northwest

WECC-Northwest is a winter-peaking assessment area in the WECC Regional Entity. The area includes Montana, Oregon, and Washington and parts of northern California and northern Idaho. The population of the area is approximately 13.6 million. It has 32,751 miles of transmission. WECC is responsible for coordinating and promoting BES reliability in the Western Interconnection. WECC's 329 members include 40 BAs, representing a wide spectrum of organizations with an interest in the BES. Serving an area of nearly 1.8 million square miles and more than 84.5 million customers, it is geographically the largest and most diverse Regional Entity. *Note: The 2025–26 WRA includes a new assessment area map for the U.S. Western Interconnection. The new assessment area boundaries provide more geographic detail of reliability risk information. WECC-Basin is a new assessment area in 2025 that was part of WECC-NW in the 2024–25 WRA.*

Highlights

- The Northwest has historically been a mixed season-peaking region.
- Operating reserve margins are expected to be met after imports in all winter scenarios.
- Total and net internal demand are up 9.3% with the primary drivers being data centers, residential electrification, transportation electrification, and semiconductor manufacturing.
- Large coal unit retirements and conventional hydro unit retirements are attributable to the reduction in existing certain capacity of 10.5%; however, planned Tier 1 resources have soared over 580%, from 463 MW to over 3 GW.
- Nameplate wind capacity is up over 3 GW (26%) and solar nameplate capacity is up nearly 2,690 MW (134%), which has also increased the solar availability on the peak hour.
- An increase in firm imports is seen in the model, 6.1 GW, absorbing the reduction in existing certain capacity of 4 GW.

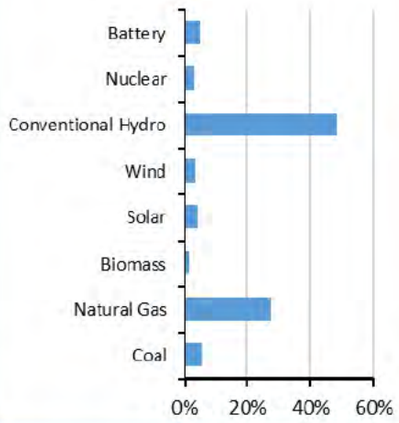
On-Peak Reserve Margin



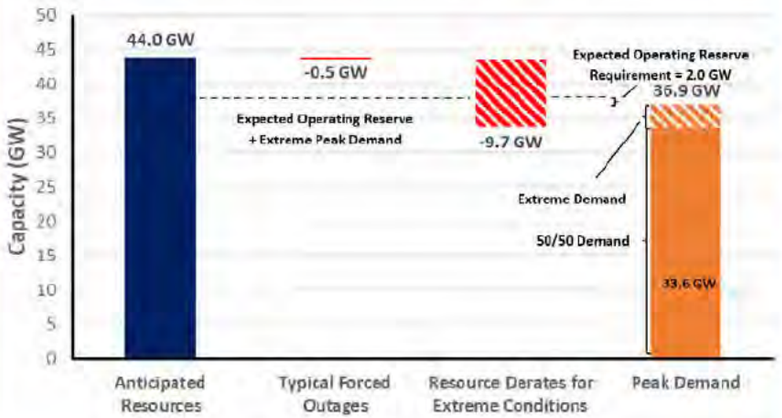
Risk Scenario Summary

Expected resources meet operating reserve requirements under normal peak demand scenarios. Above-normal peak demand combined with high generator outages in extreme conditions results in the need for external assistance to maintain reserves.

On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy is on the peak demand hour

Demand Scenarios: Net internal demand is the expected (50th percentile) peak and the 90th percentile of peak demand is the extreme forecast

Typical Forced Outages: Calculated using historical GADS

Resource Derates for Extreme Conditions: Thermal, wind, and solar are based on the hourly energy availability curves' probability distributions' 10th percentiles for the risk period. This value includes 6.8 GW of hydro derates.



WECC-Rocky Mountain

WECC-Rocky Mountain is a summer-peaking assessment area in the Western Interconnection that includes Colorado, most of Wyoming, and parts of Nebraska and South Dakota. The population of the area is approximately 6.7 million. It covers the balancing areas of the Public Service Company of Colorado and the Western Area Power Administration's Rocky Mountain Region. It has 18,797 miles of transmission. WECC is responsible for coordinating and promoting BES reliability in the Western Interconnection. WECC's 329 members include 40 BAs, representing a wide spectrum of organizations with an interest in the BES. Serving an area of nearly 1.8 million square miles and more than 84.5 million customers, it is geographically the largest and most diverse Regional Entity. *Note The 2025–26 WRA includes a new assessment area map for the U.S. Western Interconnection. The new assessment area boundaries provide more geographic detail of reliability risk information. WECC-Basin is a new assessment area in 2025 that was part of WECC-NW in the 2024–25 WRA.*

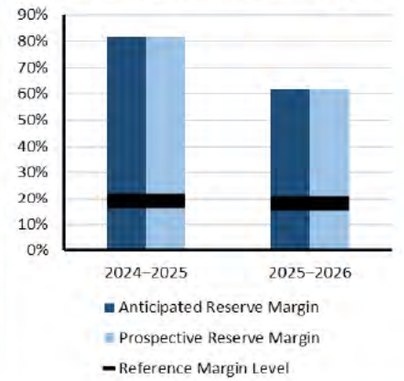
Highlights

- In Rocky Mountain, operating reserve margins are expected to be met before imports in all winter scenarios.
- Total and net internal demand are up almost 1%. The primary drivers are data centers and commercial and industrial customer growth.
- Planned Tier 1 resources are up over 84%, from almost 200 MW to over 365 MW. Solar nameplate capacity is up 27%; however, on-peak solar energy availability is down 100% due to the shift to after sunset. Expected hydro on peak energy availability is also down by around a quarter on the peak hour. Existing-Certain, Anticipated, and Prospective Reserve Margins are all down by over 20% on the peak hour; however, the region still maintains resource adequacy with margins hovering around 60% compared to the RML of 18%.
- No reliance on imports is expected to be required to maintain resource adequacy under combined extreme peak and extreme derated conditions.

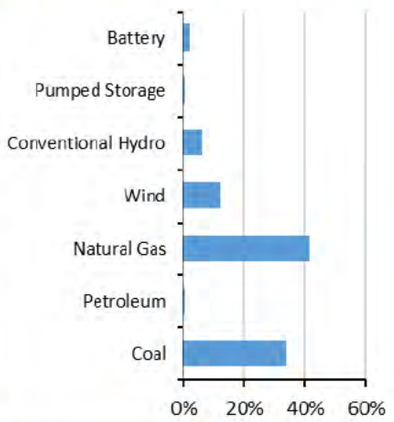
Risk Scenario Summary

Expected resources meet operating reserve requirements under assessed scenarios.

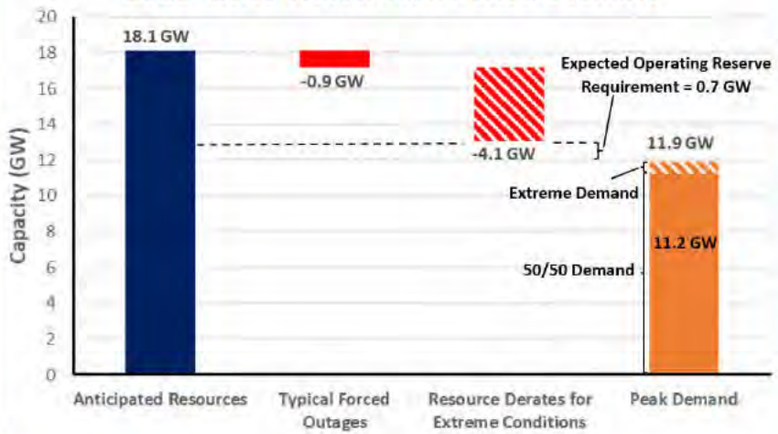
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy is on the peak demand hour

Demand Scenarios: Net internal demand is the expected (50th percentile) peak and the 90th percentile of peak demand is the extreme forecast

Typical Forced Outages: Calculated using historical GADS

Resource Derates for Extreme Conditions: Thermal, wind, and solar are based on the hourly energy availability curves' probability distributions' 10th percentiles for the risk period



WECC-Southwest

WECC-Southwest is a summer-peaking assessment area in the Western Interconnection that includes all of Arizona and New Mexico, most of Nevada, and small parts of California and Texas. The area has a population of approximately 13.6 million. It has 23,084 miles of transmission. WECC is responsible for coordinating and promoting BES reliability in the Western Interconnection. WECC's 329 members include 40 BAs, representing a wide spectrum of organizations with an interest in the BES. Serving an area of nearly 1.8 million square miles and more than 84.5 million customers, it is geographically the largest and most diverse Regional Entity. *Note The 2025–26 WRA includes a new assessment area map for the U.S. Western Interconnection. The new assessment area boundaries provide more geographic detail of reliability risk information. WECC-Basin is a new assessment area in 2025 that was part of WECC-NW in the 2024–25 WRA.*

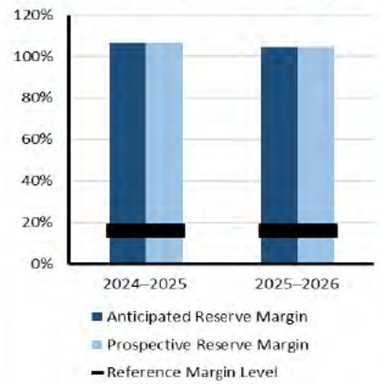
Highlights

- The Southwest is anticipated to be resource adequate under all winter expected and extreme energy availability and demand scenarios before imports.
- Total internal demand is expected to be up 1.5% and net internal demand up 2.3% since last winter. The primary drivers for load growth are data centers and industrial and residential electrification. Controllable and dispatchable demand response is down nearly half, by 163 MW.
- Planned Tier 1 resources are down over 19% as some have moved into existing certain, which is up almost 3%, over 1 GW, and other projects have experienced delays.
- Wind nameplate is up 12%, 470 MW, correlating to on-peak energy availability from wind increasing almost 11%, by 114 MW, while solar nameplate is up 27% or over 2.5 GW.

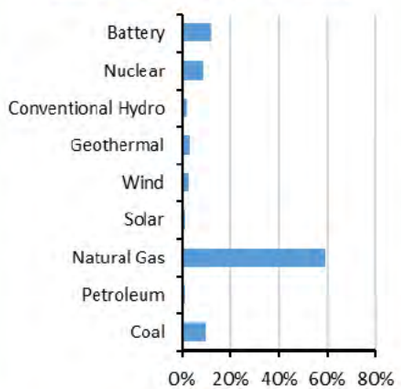
Risk Scenario Summary

Expected resources meet operating reserve requirements under assessed scenarios.

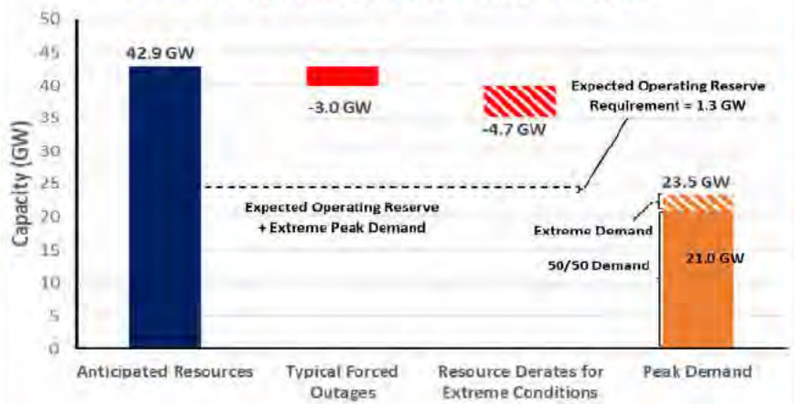
On-Peak Reserve Margin



On-Peak Resource Mix



2025–2026 Winter Risk Period Scenario



Scenario Description (See Data Concepts and Assumptions)

Risk Period: Highest risk for unserved energy is on the peak demand hour

Demand Scenarios: Net internal demand is the expected (50th percentile) peak and the 90th percentile of peak demand is the extreme forecast

Typical Forced Outages: Calculated using historical GADS

Resource Derates for Extreme Conditions: Thermal, wind, and solar are based on the hourly energy availability curves' probability distributions' 10th percentiles for the risk period

Data Concepts and Assumptions

The table below explains data concepts and important assumptions used throughout this assessment.

General Assumptions
• Reliability of the interconnected BPS is comprised of both adequacy and operating reliability:
▪ Adequacy is the ability of the electric system to supply the aggregate electric power and energy requirements of the electricity consumers at all times while taking into account scheduled and reasonably expected unscheduled outages of system components.
▪ Operating reliability is the ability of the electric system to withstand sudden disturbances, such as electric short-circuits or unanticipated loss of system components.
• The reserve margin calculation is an important industry planning metric used to examine future resource adequacy.
• All data in this assessment is based on existing federal, state, and provincial laws and regulations.
• Differences in data collection periods for each assessment area should be considered when comparing demand and capacity data between year-to-year seasonal assessments.
• A positive net transfer capability would indicate a net importing assessment area; a negative value would indicate a net exporter.
Demand Assumptions
• Electricity demand projections, or load forecasts, are provided by each assessment area.
• Load forecasts include peak hourly load[11] or total internal demand for the summer and winter of each year.[12]
• Total internal demand projections are based on normal weather (50/50 distribution)[13] and are provided on a coincident[14] basis for most assessment areas.
• Net internal demand is used in all reserve margin calculations, and it is equal to total internal demand then reduced by the amount of controllable and dispatchable demand response projected to be available during the peak hour.
Resource Assumptions
Resource planning methods vary throughout the North American BPS. NERC uses the categories below to provide a consistent approach for collecting and presenting resource adequacy. Because the electrical output of variable energy resources (VER) (e.g., wind, solar PV) depends on weather conditions, their contribution to reserve margins and other on-peak resource adequacy analysis is less than their nameplate capacity.
Anticipated Resources: • **Existing-Certain Capacity**: Included in this category are commercially operable generating units or portions of generating units that meet at least one of the following requirements when examining the period of peak demand for the summer season: unit must have a firm capability and have a power purchase agreement with firm transmission that must be in effect for the unit; unit must be classified as a designated network resource; and/or, where energy-only markets exist, unit must be a designated market resource eligible to bid into the market. • **Tier 1 Capacity Additions**: This category includes capacity that either is under construction or has received approved planning requirements. • **Net Firm Capacity Transfers (Imports minus Exports)**: This category includes transfers with firm contracts.
Prospective Resources: Includes all anticipated resources plus the following: **Existing-Other Capacity**: Included in this category are commercially operable generating units or portions of generating units that could be available to serve load for the period of peak demand for the season but do not meet the requirements of existing-certain.

[11] https://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf used in NERC Reliability Standards

[12] The summer season represents June–September and the winter season represents December–February.

[13] Essentially, this means that there is a 50% probability that actual demand will be higher and a 50% probability that actual demand will be lower than the value provided for a given season/year.

[14] Coincident: This is the sum of two or more peak loads that occur in the same hour. Noncoincident: This is the sum of two or more peak loads on individual systems that do not occur in the same time interval; this is meaningful only when considering loads within a limited period of time, such as a day, a week, a month, a heating or cooling season, and usually for not more than one year. SERC calculates total internal demand on a noncoincidental basis.

Reserve Margin Descriptions

Planning Reserve Margin: This is the primary metric used to measure resource adequacy; it is defined as the difference in resources (anticipated or prospective) and net internal demand then divided by net internal demand and shown as a percentage.

Reference Margin Level: The assumptions and naming convention of this metric vary by assessment area. The RML can be determined using both deterministic and probabilistic (based on a 0.1/year loss-of-load study) approaches. In both cases, this metric is used by system planners to quantify the amount of reserve capacity in the system above the forecasted peak demand that is needed to ensure sufficient supply to meet peak loads. Establishing an RML is necessary to account for long-term factors of uncertainty involved in system planning, such as unexpected generator outages and extreme weather impacts that could lead to increase demand beyond what was projected in the 50/50 load forecasted. In many assessment areas, an RML is established by a state, provincial authority, ISO/Regional Transmission Organization (RTO), or other regulatory body. In some cases, the RML is a requirement. RMLs may be different for the summer and winter seasons. If an RML is not provided by an assessment area, NERC applies 15% for predominantly thermal systems and 10% for predominantly hydro systems.

Seasonal Risk Scenario Chart Description

Each assessment area performed an operational risk analysis that was used to produce the seasonal risk scenario charts in the **Regional Assessments Dashboards**. The chart presents deterministic scenarios for further analysis of different resource and demand levels: The left blue column shows anticipated resources, and the two orange columns at the right show the two demand scenarios of the normal peak net internal demand and the extreme summer peak demand—both determined by the assessment area. The middle red or green bars show adjustments that are applied cumulatively to the anticipated resources, such as the following:

- Reductions for typical generation outages (i.e., maintenance and forced outages that are not already accounted for in anticipated resources)
- Reductions that represent additional outage or performance derating by resource type for extreme, low-probability conditions (e.g., drought condition impacts on hydroelectric generation, low-wind scenario affecting wind generation, fuel supply limitations, or extreme temperature conditions that result in reduced thermal generation output)
- Additional capacity resources that represent quantified capacity from operational procedures, if any, that are made available during scarcity conditions

Not all assessment areas have the same categories of adjustments to anticipated resources. Furthermore, each assessment area determined the adjustments to capacity based on methods or assumptions that are summarized below the chart. Methods and assumptions differ by assessment area and may not be comparable.

The chart enables evaluation of resource levels against levels of expected operating reserve requirement and the forecasted demand. Furthermore, the effects from extreme events can also be examined by comparing resource levels after applying extreme scenario derates and/or extreme summer peak demand.

Resource Adequacy

The ARM, which is based on available resource capacity, is a metric used to evaluate resource adequacy by comparing the projected capability of anticipated resources to serve forecast peak demand.[15] Large year-to-year changes in anticipated resources or forecast peak demand (net internal demand) can greatly impact Planning Reserve Margin calculations. NPCC-Maritimes marginally does not meet its RML for the upcoming winter. Other than NPCC-Maritimes, all assessment areas have sufficient ARMs to meet or exceed their RML for the 2025 winter as shown in Figure 4.

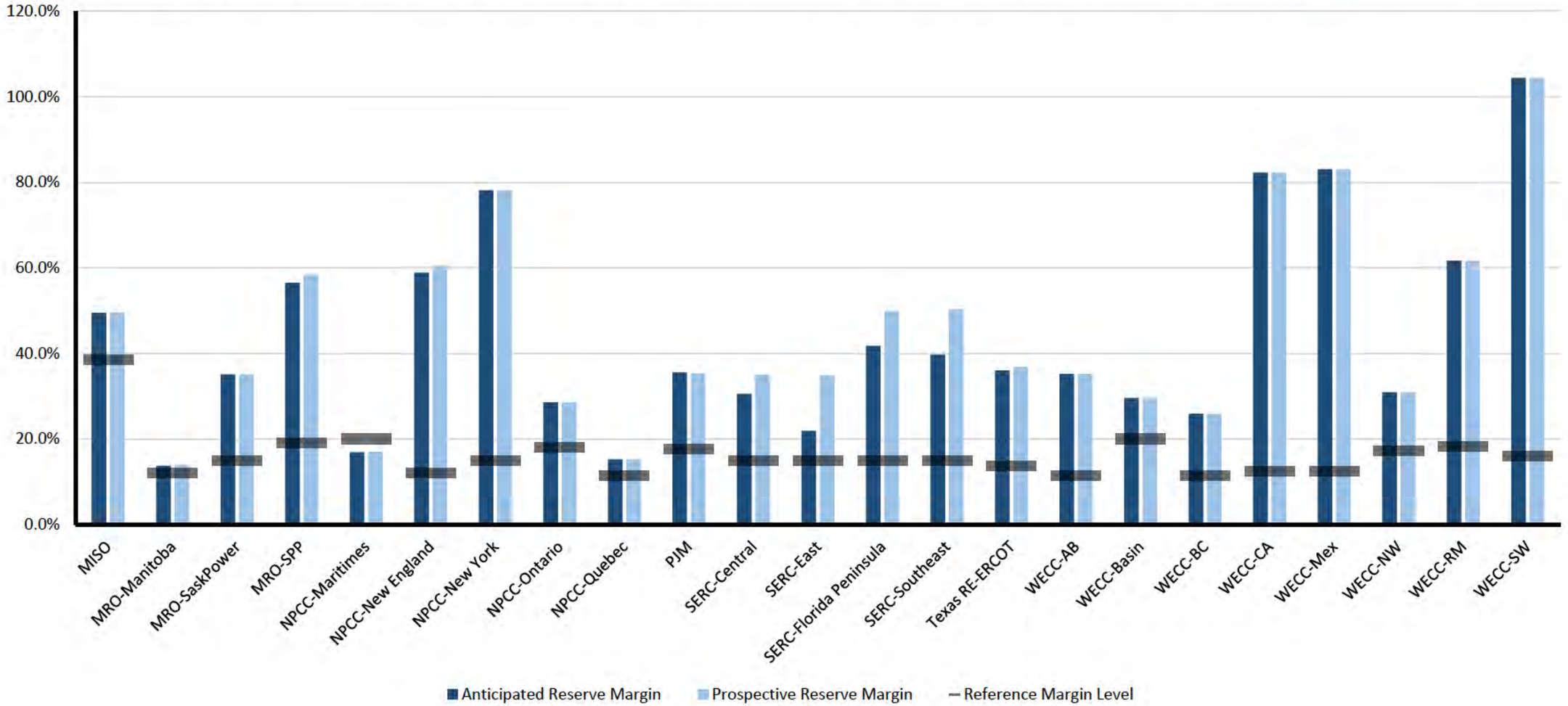


Figure 4: Winter 2025–2026 Anticipated/Prospective Reserve Margins Compared to Reference Margin Level

[15] Generally, anticipated resources include generators and firm capacity transfers that are expected to be available to serve load during electrical peak loads for the season. Prospective resources are those that could be available but do not meet criteria to be counted as anticipated resources. Refer to the Data Concepts and Assumptions section for additional information on Anticipated/Prospective Reserve Margins, anticipated/prospective resources, and RMLs.

Changes from Year-to-Year

Figure 5 provides the relative change in the forecast ARMs from the 2024–2025 Winter to the 2025–2026 Winter. All areas except NPCC-Maritimes remain above their RMLs for 2025–2026 Winter. The Canadian winter-peaking systems, which include MRO-Manitoba, MRO-SaskPower, NPCC-Maritimes, NPCC-Québec, WECC-Alberta, and WECC-British Columbia, may have reserve margins that are near RMLs but are unlikely to experience high outage rates from their winterized generators. Additional details are provided in the Data Concepts and Assumptions section.

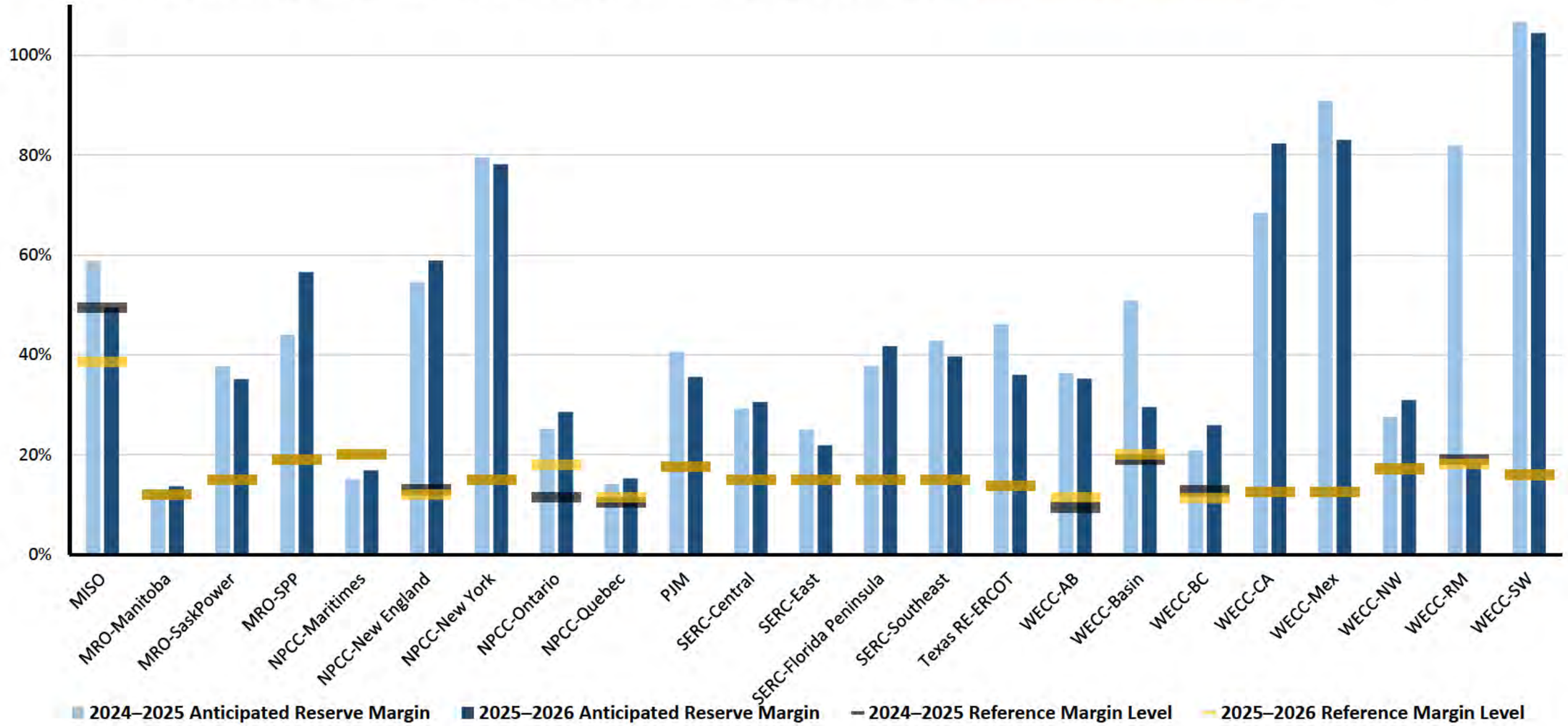


Figure 5: Winter 2024–2025 and Winter 2025–2026 Anticipated Reserve Margins Year-to-Year Change

Demand and Resource Tables

Peak demand and supply capacity data (i.e., resource adequacy data) for each assessment area are as follows in each table.

MISO			
Demand, Resource, and Reserve Margins	**2024–2025 WRA[16]**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	102,353	105,249	2.8%
Demand Response: Available	6,219	8,250	32.7%
Net Internal Demand	96,134	96,999	0.9%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	150,407	142,880	-5.0%
Tier 1 Planned Capacity	122	0	0.0%
Net Firm Capacity Transfers	2,310	2,113	-8.5%
Anticipated Resources	152,717	144,993	-5.1%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	152,839	144,993	-5.1%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	58.9%	49.5%	-9.4
Prospective Reserve Margin	59.0%	49.5%	-9.5
Reference Margin Level	49.4%	38.6%	-10.8

MRO-SPP			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	45,788	47,168	3.0%
Demand Response: Available	1,128	1,091	-3.3%
Net Internal Demand	45,926	46,077	0.3%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	67,252	71,074	5.7%
Tier 1 Planned Capacity	0	1087	0.0%
Net Firm Capacity Transfers	-1,116	-32	-97.1%
Anticipated Resources	66,136	72,129	9.1%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	66,090	73,029	10.5%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	44.0%	56.5%	12.5
Prospective Reserve Margin	43.9%	58.5%	14.6
Reference Margin Level	19.0%	19.0%	0.0

MRO-SaskPower			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	3,852	3,944	2.4%
Demand Response: Available	50	50	0.0%
Net Internal Demand	3,802	3,894	2.4%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	4,946	4,972	0.5%
Tier 1 Planned Capacity	0	0	0.0%
Net Firm Capacity Transfers	290	290	0.0%
Anticipated Resources	5,236	5,262	0.5%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	5,236	5,262	0.5%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	37.7%	35.1%	-2.6
Prospective Reserve Margin	37.7%	35.1%	-2.6
Reference Margin Level	15.0%	15.0%	0.0

MRO-Manitoba Hydro			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	4,814	4,903	1.8%
Demand Response: Available	0	0	0.0%
Net Internal Demand	4,814	4,903	1.8%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	5,924	5,688	-4.0%
Tier 1 Planned Capacity	10	0	-100.0%
Net Firm Capacity Transfers	-527	-113	-78.5%
Anticipated Resources	5,407	5,575	3.1%
Existing-Other Capacity	18	13	-26.8%
Prospective Resources	5,425	5,588	3.0%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	12.3%	13.7%	1.4
Prospective Reserve Margin	12.7%	14.0%	1.3
Reference Margin Level	12.0%	12.0%	0.0

[16] MISO-provided updated data post 2024-25 WRA publication.

NPCC-Maritimes			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	6,167	6,061	-1.7%
Demand Response: Available	259	248	-4.4%
Net Internal Demand	5,907	5,813	-1.6%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	6,647	6,704	0.9%
Tier 1 Planned Capacity	6	88	0.0%
Net Firm Capacity Transfers	145	1	-99.0%
Anticipated Resources	6,798	6,794	-0.1%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	6,798	6,800	0.0%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	15.1%	16.9%	1.8
Prospective Reserve Margin	15.1%	17.0%	1.9
Reference Margin Level	20.0%	20.0%	0.0

NPCC-New England			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	20,651	20,056	-2.9%
Demand Response: Available	343	440	28.2%
Net Internal Demand	20,308	19,616	-3.4%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	30,030	29,935	-0.3%
Tier 1 Planned Capacity	194	0	-100.0%
Net Firm Capacity Transfers	1,161	1,235	6.4%
Anticipated Resources	31,385	31,170	-0.7%
Existing-Other Capacity	306	322	5.2%
Prospective Resources	31,691	31,492	-0.6%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	54.5%	58.9%	4.4
Prospective Reserve Margin	56.1%	60.5%	4.5
Reference Margin Level	13.0%	12.0%	-1.0

NPCC-New York			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	23,800	24,200	1.7%
Demand Response: Available	802	1,027	28.1%
Net Internal Demand	22,998	23,173	0.8%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	40,522	40,080	-1.1%
Tier 1 Planned Capacity	0	0	0.0%
Net Firm Capacity Transfers	759	1,203	58.5%
Anticipated Resources	41,281	41,283	0.0%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	41,281	41,283	0.0%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	79.5%	78.2%	-1.3
Prospective Reserve Margin	79.5%	78.2%	-1.3
Reference Margin Level	15.0%	15.0%	0.0

NPCC-Ontario			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	21,898	22,013	0.7%
Demand Response: Available	915	868	-5.2%
Net Internal Demand	20,982	21,146	0.9%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	26,652	27,319	2.5%
Tier 1 Planned Capacity	0	294	#DIV/0!
Net Firm Capacity Transfers	-450	-420	-6.7%
Anticipated Resources	26,202	27,193	3.8%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	26,202	27,193	3.8%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	25.1%	28.6%	3.5
Prospective Reserve Margin	25.1%	28.6%	3.5
Reference Margin Level	11.5%	18.0%	6.5

NPCC-Québec			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	40,512	40,799	0.8%
Demand Response: Available	4,451	4,902	10.9%
Net Internal Demand	36,061	35,897	-0.4%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	41,560	41,698	0.3%
Tier 1 Planned Capacity	73	61	0.0%
Net Firm Capacity Transfers	-479	-390	-18.6%
Anticipated Resources	41,154	41,368	0.5%
Existing-Other Capacity	-479	0	0.0%
Prospective Resources	41,154	41,368	0.5%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	14.1%	15.2%	1.1
Prospective Reserve Margin	14.1%	15.2%	1.1
Reference Margin Level	10.5%	11.5%	1.0

PJM			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	136,328	140,827	3.3%
Demand Response: Available	5,616	5,998	6.8%
Net Internal Demand	130,712	134,829	3.1%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	179,216	178,335	-0.5%
Tier 1 Planned Capacity	0	0	0.0%
Net Firm Capacity Transfers	4,502	4,448	-1.2%
Anticipated Resources	183,718	182,783	-0.5%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	183,718	182,452	-0.7%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	40.6%	35.6%	-5.0
Prospective Reserve Margin	40.6%	35.3%	-5.2
Reference Margin Level	17.7%	17.7%	-12.3

SERC-Central			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	42,895	42,875	0.0%
Demand Response: Available	1,497	2,809	87.6%
Net Internal Demand	41,397	40,067	-3.2%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	51,578	50,454	-2.2%
Tier 1 Planned Capacity	0	0	0%
Net Firm Capacity Transfers	1,922	1,847	-3.9%
Anticipated Resources	53,500	52,301	-2.2%
Existing-Other Capacity	1,498	1,810	20.8%
Prospective Resources	54,998	54,111	-1.6%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	29.2%	30.5%	1.3
Prospective Reserve Margin	32.9%	35.1%	2.2
Reference Margin Level	15.0%	15.0%	0.0

SERC-East			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	45,005	45,703	1.6%
Demand Response: Available	982	888	-9.6%
Net Internal Demand	44,023	44,815	1.8%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	54,379	54,460	0.1%
Tier 1 Planned Capacity	72	11	-84.3%
Net Firm Capacity Transfers	593	150	-74.7%
Anticipated Resources	55,045	54,622	-0.8%
Existing-Other Capacity	5,209	5,832	12.0%
Prospective Resources	60,254	60,453	0.3%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	25.0%	21.9%	-3.2
Prospective Reserve Margin	36.9%	34.9%	-2.0
Reference Margin Level	15.0%	15.0%	0.0

SERC-Florida Peninsula			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	48,494	48,628	0.3%
Demand Response: Available	2,780	3,127	12.5%
Net Internal Demand	45,714	45,501	-0.5%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	62,579	63,502	1.5%
Tier 1 Planned Capacity	15	692	4510.0%
Net Firm Capacity Transfers	400	300	-25.0%
Anticipated Resources	62,994	64,494	2.4%
Existing-Other Capacity	3,673	3,671	0.0%
Prospective Resources	66,667	68,165	2.2%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	37.8%	41.7%	3.9
Prospective Reserve Margin	45.8%	49.8%	4.0
Reference Margin Level	15.0%	15.0%	0.0

SERC-Southeast			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	45,308	47,056	3.9%
Demand Response: Available	1,638	1,365	-16.7%
Net Internal Demand	43,670	45,691	4.6%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	62,805	63,339	0.9%
Tier 1 Planned Capacity	765	0	-100.0%
Net Firm Capacity Transfers	-1,192	489	-141.0%
Anticipated Resources	62,378	63,828	2.3%
Existing-Other Capacity	3,920	4,847	23.7%
Prospective Resources	66,298	68,675	3.6%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	42.8%	39.7%	-3.1
Prospective Reserve Margin	51.8%	50.3%	-1.5
Reference Margin Level	15.0%	15.0%	0.0

Texas RE-ERCOT			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	73,193	77,387	5.7%
Demand Response: Available	5,447	9,330	71.3%
Net Internal Demand	67,746	68,057	0.5%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	98,712	89,977	-8.8%
Tier 1 Planned Capacity	239	1351	464.9%
Net Firm Capacity Transfers	20	1,235	6075.0%
Anticipated Resources	98,971	92,562	-6.5%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	99,691	93,137	-6.6%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	46.1%	36.0%	-10.1
Prospective Reserve Margin	47.2%	36.9%	-10.3
Reference Margin Level	13.75%	13.8%	0.0

WECC-AB			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	12,280	12,411	1.1%
Demand Response: Available	0	0	0.0%
Net Internal Demand	12,280	12,411	1.1%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	13,535	16,658	23.1%
Tier 1 Planned Capacity	3206	124	-96.1%
Net Firm Capacity Transfers	0	0	0.0%
Anticipated Resources	16,740	16,782	0.3%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	16,740	16,782	0.3%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	36.3%	35.2%	-1.1
Prospective Reserve Margin	36.3%	35.2%	-1.1
Reference Margin Level	9.5%	11.5%	2.0

WECC-Basin			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	10,568	10,758	1.8%
Demand Response: Available	85	170	100.0%
Net Internal Demand	10,483	10,588	1.0%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	13,213	13,183	-0.2%
Tier 1 Planned Capacity	2,605	533	-79.5%
Net Firm Capacity Transfers	0	0	0%
Anticipated Resources	15,817	13,717	-13.3%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	15,817	13,717	-13.3%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	50.9%	29.6%	-21.3
Prospective Reserve Margin	50.9%	29.6%	-21.3
Reference Margin Level	19.0%	20.0%	1.0

WECC-CA			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	36,441	36,281	-0.4%
Demand Response: Available	743	666	-10.4%
Net Internal Demand	35,698	35,615	-0.2%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	55,380	57,923	4.6%
Tier 1 Planned Capacity	4,757	6,997	47.1%
Net Firm Capacity Transfers	0	0	0.0%
Anticipated Resources	60,138	64,920	8.0%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	60,138	65,920	8.0%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	68.5%	82.3%	13.8
Prospective Reserve Margin	68.5%	82.3%	13.8
Reference Margin Level	12.5%	12.5%	0.0

WECC-BC			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	11,966	11,936	-0.3%
Demand Response: Available	0	0	0.0%
Net Internal Demand	11,966	11,936	-0.3%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	13,870	14,389	3.7%
Tier 1 Planned Capacity	433	637	47.0%
Net Firm Capacity Transfers	164	0	-100.0%
Anticipated Resources	14,467	15,026	3.9%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	14,467	15,026	3.9%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	20.9%	25.9%	5.0
Prospective Reserve Margin	20.9%	25.9%	5.0
Reference Margin Level	12.8%	11.4%	-1.5

WECC-Mexico			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–2025 vs. 2025–2026**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	1,983	1,977	-0.3%
Demand Response: Available	0	0	0%
Net Internal Demand	1,983	1,977	-0.3%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	3,733	3,619	-3.0%
Tier 1 Planned Capacity	52	0	-100.0%
Net Firm Capacity Transfers	0	0	0%!
Anticipated Resources	3,784	3,619	-4.4%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	3,784	3,619	-4.4%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	90.8%	83.1%	-7.8
Prospective Reserve Margin	90.8%	83.1%	-7.8
Reference Margin Level	12.5%	12.5%	0

WECC-Northwest			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–25 vs. 2025–26**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	30,748	33,604	9.3%
Demand Response: Available	30	30	0.0%
Net Internal Demand	30,718	33,574	9.3%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	38,729	34,671	-10.5%
Tier 1 Planned Capacity	463	3,152	581.5%
Net Firm Capacity Transfers	0	6,136	100%!
Anticipated Resources	39,192	43,959	12.2%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	39,192	43,959	12.2%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	27.6%	30.9%	3.3
Prospective Reserve Margin	27.6%	30.9%	3.3
Reference Margin Level	17.2%	17.2%	0.0

WECC-Rocky Mountain			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–25 vs. 2025–26**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	10,481	11,501	9.7%
Demand Response: Available	282	285	1.1%
Net Internal Demand	10,199	11,216	10.0%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	18,356	17,768	-3.2%
Tier 1 Planned Capacity	199	366	84.3%
Net Firm Capacity Transfers	0	0	0%
Anticipated Resources	18,555	18,134	-2.3%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	18,555	18,134	-2.3%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	81.9%	61.7%	-20.3
Prospective Reserve Margin	81.9%	61.7%	-20.3
Reference Margin Level	19.0%	18.2%	-0.8

WECC-Southwest			
Demand, Resource, and Reserve Margins	**2024–2025 WRA**	**2025–2026 WRA**	**2024–25 vs. 2025–26**
Demand Projections	**MW**	**MW**	**Net Change (%)**
Total Internal Demand (50/50)	20,844	21,147	1.5%
Demand Response: Available	340	177	-47.9%
Net Internal Demand	20,504	20,970	2.3%
Resource Projections	**MW**	**MW**	**Net Change (%)**
Existing-Certain Capacity	38,991	40,135	2.9%
Tier 1 Planned Capacity	3,381	2,733	-19.2%
Net Firm Capacity Transfers	0	0	0.0%
Anticipated Resources	42,372	42,868	1.2%
Existing-Other Capacity	0	0	0.0%
Prospective Resources	42,372	42,868	1.2%
Reserve Margins	**Percent (%)**	**Percent (%)**	**Annual Difference**
Anticipated Reserve Margin	106.6%	104.4%	-2.2
Prospective Reserve Margin	106.6%	104.4%	-2.2
Reference Margin Level	16.0%	16.0%	0.0

Variable Energy Resource Contributions

Because the electrical output of VERs (e.g., wind, solar PV) depends on weather conditions, on-peak capacity contributions are less than nameplate capacity and may vary widely year to year based on the identified risk hour. In many areas, winter demand peaks in the early morning hours or early evening resulting in little or no electrical resource output from solar PV resources and wide variability in wind availability. The following table shows the capacity contribution of existing wind and solar PV resources at the identified risk hour for each assessment area. Resource contributions are also aggregated by Interconnection and across the entire BPS.

BPS Variable Energy Resources On-Peak Capacity Contributions by Assessment Area									
	Wind			Solar			Hydro		
Assessment Area/Interconnection	Nameplate Wind (MW)	Expected Wind (MW)	Expected Share of Nameplate (%)	Nameplate Solar PV (MW)	Expected Solar (MW)	Expected Share of Nameplate (%)	Nameplate Hydro (MW)	Expected Hydro (MW)	Expected Share of Nameplate (%)
MISO	30,247	8,772	29%	13,726	686	5%	9,103	5,354	59%
MRO-Manitoba Hydro	259	52	20%	0	0	0%	6,288	5,676	90%
MRO-SaskPower	816	433	53%	30	0	13%	884	703	80%
MRO-SPP	35,714	7,198	20%	1,197	457	38%	5,602	5,521	99%
NPCC-Maritimes	1,635	241	15%	155	10	6%	1,357	1,283	0%
NPCC-New England	2,675	455	17%	3,620	0	0%	3,742	1,453	39%
NPCC-New York	2,586	737	29%	627	0	0%	6,357	5,283	83%
NPCC-Ontario	4,943	1,971	40%	478	0	0%	8,763	6,824	78%
NPCC-Québec	4,024	1,426	35%	10	0	0%	41,014	39,501	96%
PJM	13,318	5,463	41%	15,732	1	0%	8,134	7,900	97%
SERC-Central	1,324	370	28%	1,576	455	29%	4,991	4,027	81%
SERC-East	0	0	0%	7,068	1,792	25%	3,010	2,951	98%
SERC-Florida Peninsula	0	0	0%	12,058	2,151	18%	0	0	0%
SERC-Southeast	0	0	0%	8,670	4,461	51%	3,258	3,258	100%
Texas RE-ERCOT	40,629	7,833	19%	35,609	660	2%	579	566	98%
WECC-AB	5,712	1,919	34%	2,206	0	0%	1,788	570	32%
WECC-Basin	5,932	1,148	19%	3,853	62	2%	5,334	2,946	55%
WECC-BC	747	85	11%	17	0	0%	35,504	27,119	76%
WECC-CA	9,382	682	7%	28,328	0	0%	31,479	9,143	29%
WECC-Mex	40	4	11%	350	0	0%	0	0	0%
WECC-NW	14,744	1,319	9%	4,695	1,556	33%	65,830	37,005	56%
WECC-RM	5,681	2,265	40%	3,521	0	0%	6,502	2,654	41%
WECC-SW	4,303	1,182	27%	12,139	391	3%	6,234	1,896	30%
EASTERN INTERCONNECTION	93,517	25,692	27%	64,937	10,013	15%	61,489	50,233	82%
QUÉBEC INTERCONNECTION	4,024	1,426	35%	10	0	0%	41,014	39,501	96%
TEXAS INTERCONNECTION	40,629	7,833	19%	35,609	660	0%	579	566	98%
WECC INTERCONNECTION	46,541	8,605	19%	55,108	2,008	4%	152,671	81,333	53%
INTERCONNECTION TOTAL:	**184,711**	**43,556**	**23%**	**155,664**	**12,685**	**8%**	**255,753**	**171,633**	**67%**

Review of Winter 2024–2025 Capacity and Energy Performance

The meteorological winter across the contiguous United States had an average temperature of 34.1 degrees F—1.9 degrees above average—ranking in the warmest third of NOAA's historical record. Total winter precipitation in the US was 5.87 inches, 0.92 of an inch below average, ranking in the driest third of the December–February climate record.[17] Most of Canada experienced temperatures at least 2°C above the baseline average with the Maritime provinces, southern Ontario, and the Canadian west coast recording temperature departures nearer the baseline average while a small region in southern Saskatchewan recorded temperatures just slightly below the baseline average.[18]

In February 2025, FERC and NERC and its Regional Entities launched a joint review of the BPS' performance during the January 2025 arctic events, which comprised Winter Storms Blair, Cora, Demi, and Enzo.[19] The week of January 19–25, 2025 was the third coldest winter week (spanning Sunday through Saturday) across the United States since 2000. Between January 21 and 22, 2025, natural gas demand peaked at 150 Bcf/day, electric demand peaked at 683 GW, and unplanned outages peaked at 71,022 MW. Nevertheless, during the January 2025 arctic events, manual load shed was not required. The January 2025 arctic events had lower observed hourly wind chill temperatures in pockets of the Northeast, the Louisiana Gulf, California, and the Southwest compared to Winter Storms Uri, Elliott, Gerri, and Heather. During the January 2025 arctic events, the most extreme storm relative to typical weather was Winter Storm Enzo—a Gulf and Southern storm. On January 20, 2025, a burst of snow, sleet, and freezing rain developed across Texas and Louisiana late in the day. A mixture of sleet and freezing rain fell from Austin to San Antonio and to the southernmost point of Texas. By the early morning hours of January 21, 2025, for the first time in history, a blizzard warning was issued for southwest Louisiana and the southeastern-most point of Texas. Snow fell in Gulf cities in Texas, southern Mississippi, southern Alabama, and western Florida. On January 21, 2025, Baton Rouge recorded 7.6 inches of snowfall, making it the city's snowiest day since recordkeeping began in 1892, while New Orleans saw its snowiest day on record, with a total of 8.0 inches. Temperatures plunged to single digits in Louisiana. Temperatures in some parts of the state fell to levels not seen in more than 125 years.

The review team engaged with 10 electric entities across the Eastern and Texas Interconnections to gather the information necessary to provide a high-level overview of the BPS' performance during the cold weather events. Based on the data and interviews that the team reviewed, electric generators appear to have performed better during the January 2025 arctic events because of additional generator commitments, improved preparedness, increased situational awareness, and the implementation of lessons learned from previous extreme cold weather events and prior report recommendations. The natural gas system also performed better overall, serving record levels of natural gas demand and experiencing only minor production declines and short-duration force majeure events.

On October 1, 2025, NERC submitted to the Federal Energy Regulatory Commission its first *Cold Weather Data Annual Report*. This report includes a review of forced outage data from GADS for the winter 2024–2025 period indicating performance consistent with historical performance as reported in NERC's annual *State of Reliability* report. This is within the normal range of capacity that occurs across the fleet. During the Winter 2024–2025 period, the highest amount of capacity in a forced outage state for all reasons occurred on January 20, 2025, with 68,519 MW across all regions. The outages occurring over January 20, 2025, were analyzed as part of the joint FERC, NERC, and Regional Entity *2025 System Performance Review*. The joint FERC, NERC, and Regional Entity *2025 System Performance Review* found a reduction in peak coincident unplanned generator outages for the four 2025 winter storms reviewed compared to past winter storms; however, this review also noted that it was not an exact comparison due to prior winter storms having different characteristics.

Eastern Interconnection–Canada and Québec Interconnection

No EEAs were needed during the previous winter season. One entity plans to make a slight increase to the demand-response program based on last winter's operations.

[17] Despite Arctic air outbreaks, U.S. had warm, dry winter on average | National Oceanic and Atmospheric Administration
[18] Climate Trends and Variations Bulletin – Winter 2024/2025 - Canada.ca
[19] https://www.ferc.gov/media/report-january-2025-arctic-events-system-performance-review-ferc-nerc-and-its-regional

Eastern Interconnection–United States

Several entities indicated that generators performed better during the January 2025 arctic events than in previous winter storms. For example, TVA stated that generator performance within its footprint was stable, with minimal natural gas delivery issues. Southeastern RC detailed that no major fuel-related outages occurred. FRCC noted that generator performance was strong during this period. The significant characteristics of Winter Storm Enzo in the Southern and Gulf states were freezing precipitation and snow accumulation, especially in regions where those conditions rarely occur. In FRCC, only the northern portion of Florida experienced severe arctic weather including freezing precipitation and snowfall (record-setting, in some cities) that were abnormal for the region even though certain northern cities have faced cold temperatures in the past. In Florida, entities experienced energy emergencies caused by extended generation outages from hurricanes Milton and Helene, compounded by unusually high loads from cold weather. Entities were able to serve native load and firm delivery obligations, though non-firm sales were curtailed during certain events. ISO-NE, NYISO, and PJM all generally described the January 2025 arctic events as having cold temperatures but overall weather conditions that were similar to a winter without a major storm.

MISO emerged from Winter 2024–2025 without turning to emergency procedures despite the wide-ranging winter storms from January 6 to 9 and again from January 20 to 22. Generators continue to prioritize scheduling planned or maintenance outages to the shoulder seasons of fall and spring to maximize unit availability for the winter season. Also, extreme cold weather outage adders were added to the LOLE model to make sure that winter storm risks are included in planning. In PJM, demand reached a new all-time winter peak on January 22, 2025, of 143,714 MW with sufficient reserves. PJM did call an EEA1 on January 22, 2025, however reserves remained adequate. PJM had less than 3% load forecast error over the peak days of the January cold weather events. Reliability cases were conducted, and units with extended start times were evaluated and started early to ensure units were on-line before extreme cold weather settled in. PJM had a 9.24% forced outage rate on the peak day, a relatively low forced outage rate for the weather experienced. There were also very few gas production problems; however, market issues prevented proper scheduling because of the four-day holiday weekend.

In SERC-Central, entities reported only limited impacts from Winter 2024–2025 coldest weather and made minor adjustments. One entity declared conservative operations ahead of peak conditions but experienced no emergencies. One entity raised its winter Planning Reserve Margin target to 26% following lessons learned from Winter Storm Elliott. Corrective actions were implemented due to isolated equipment issues, including improved heat trace capabilities and adding heat trace equipment to the cold weather critical component list. During the previous winter season, some SERC-Florida Peninsula entities experienced energy emergencies caused by extended generation outages from hurricanes Milton and Helene, compounded by unusually high loads from cold weather. Despite these challenges, entities were able to serve native load and firm delivery obligations, though non-firm sales were curtailed during certain events.

Texas Interconnection–ERCOT

There were no energy emergencies for the Texas RE-ERCOT region last winter and no conditions that prompted changes in operating procedures. Winter Storm Kingston, which occurred in February 2025, was the only storm where ERCOT utilized firm fuel supply service resources (FFSS), a firm-fuel product that provides additional grid reliability and resiliency during extreme cold weather and compensates generation resources that meet a higher resiliency standard. A maximum FFSS deployment of 470 MW occurred on February 19 between the hours 13:10 and 17:02. Two other storms, Enzo and Cora, impacted ERCOT in January 2025, but these storms did not cause any system reliability issues.

Western Interconnection

Between January 11 and 17, 2024, a prolonged Arctic outbreak impacted British Columbia, Alberta, and the U.S. Pacific Northwest, driving record electricity demand and widespread reliability challenges. Four U.S. Northwest BAs and one Canadian BA declared energy emergencies, underscoring two core vulnerabilities: Inadequate capacity during evening peak hours (4 to 8 p.m.) and Insufficient fuel supply (limited hydro availability) across multiple days.

Although temperatures were comparable to the December 2022 cold snap, WECC-Northwest peak demand rose two percentage points to 6% over then, with BC Hydro and AESO both setting new all-time records. The U.S. Northwest relied heavily on imports—averaging 4,745 MW during peaks and 5,241 MW across all hours, mostly from the Southwest and Rockies. California remained a net importer, providing little relief. Market prices in the Northwest reached or neared caps across most hours, indicating persistent scarcity rather than short-term peaks. Overall, the January 2024 event illustrated capacity alone does not ensure resilience. Sustained energy availability with interregional flexibility (both physical and market-based) will be key to maintaining reliability through the 2025–2026 and future winter seasons.

2024–2025 Winter Demand and Generation Summary at Peak Demand											
Assessment Area	**Peak Demand Date**	**Peak Demand Hour**	**Demand[1] (MW)**	**WRA Peak Demand Scenarios[2] (MW)**	**Generation[1] (MWh)**	**Transfers[1] (MW)**	**Wind – Actual[1] (MWh)**	**Wind – Expected[3] (MW)**	**Solar – Actual[1] (MWh)**	**Solar – Expected[3] (MW)**	**Forced Outages Summary[4] (MW)**
MISO	Jan. 21	18:00	108,888*	96,134 100,395	101,655	-977	18,468	16,761	0	519	17,010
MRO-Manitoba Hydro	Jan. 20	08:00	5,132	4,814 5,060	5,292	-277	142	52	N/A	0	146
MRO-SaskPower	Dec. 18	18:00	3,785	3,802 3,897	3,641	-231	664	368	0	3	0
MRO-SPP	Feb. 20	08:00	47,981	45,926 47,054	40,898	-1,424	4,886	4,783	255	36	9,272
NPCC-Maritimes	Jan. 22	07:00	5,810	5,907 6,498	4,266	-1,174	368	261	3	5	*
NPCC-New England	Jan. 21	18:00	19,607	20,308 21,814	17,686	-1,896	285	329	4	23	624
NPCC-New York	Jan. 22	19:00	23,521	22,998 24,023	18,932	-4,589	654	728	0	0	4,835

2024–2025 Winter Demand and Generation Summary at Peak Demand											
Assessment Area	Peak Demand Date	Peak Demand Hour	Demand[1] (MW)	WRA Peak Demand Scenarios[2] (MW)	Generation[1] (MWh)	Transfers[1] (MW)	Wind – Actual[1] (MWh)	Wind – Expected[3] (MW)	Solar – Actual[1] (MWh)	Solar – Expected[3] (MW)	Forced Outages Summary[4] (MW)
NPCC-Ontario	Jan. 22	18:00	21,940	20,951 22,179	24,250	2,990	3,693	1,914	0	0	*
NPCC-Québec	Jan. 22	08:00	37,178	36,061 39,545	39,514	-766	1,463	1,449	0	0	*
PJM	Jan. 22	09:00	144,420	130,712 144,939	152,142	7,731	3,704	3,620	3,076	1	8,663
SERC-C	Jan. 22	08:00	47,815	41,397 47,062	40,898	-6,921	563	176	214	455	1,538
SERC-E	Jan. 23	08:00	47,130	44,023 47,662	41,810	-5,323	0	0	145	2,526	1,830
SERC-FP	Jan. 25	08:00	43,974	45,714 54,239	41,702	-557	0	0	362	1,684	2,824
SERC-SE	Jan. 22	08:00	46,490	43,670 45,116	48,227	1,741	0	0	592	3,861	2,210

2024–2025 Winter Demand and Generation Summary at Peak Demand											
Assessment Area	**Peak Demand Date**	**Peak Demand Hour**	**Demand[1] (MW)**	**WRA Peak Demand Scenarios[2] (MW)**	**Generation[1] (MWh)**	**Transfers[1] (MW)**	**Wind – Actual[1] (MWh)**	**Wind – Expected[3] (MW)**	**Solar – Actual[1] (MWh)**	**Solar – Expected[3] (MW)**	**Forced Outages Summary[4] (MW)**
TRE-ERCOT	Feb. 20	08:00	80,560	73,193[5] 90,405[5]	79,960	-191	9,397	15,697	1,586	15	5,742
WECC-AB	Dec. 18	17:00	12,241	12,280 12,635	12,711	-470	3,175	1,867	4	0	*
WECC-BC	Feb 3	18:00	11,359	11,996 12,749	11,415	44	70	279	0	0	839
WECC-CA/MX	Dec. 12	15:00	35,555	35,359 36,823	31,925	-4,669	4,021	569	11,547	0	1,627
WECC-NW	Feb. 12	08:00	54,278	58,001 62,230	48,437	-920	2,607	7,876	1,494	2,198	3,281
WECC-SW	Feb. 13	16:00	22,969	16,177 17,777	25,087	2,117	2,741	1,065	1,599	182	1,496
Highlighting Notes:			Actual peak demand in the highlighted areas met or exceeded extreme scenario levels				Actual wind output in highlighted areas was significantly below seasonal forecast.		Actual solar output in highlighted areas was significantly below seasonal forecast.		Actual forced outages above or below forecast by factor of two

2024–2025 Winter Demand and Generation Summary at Peak Demand											
Assessment Area	**Peak Demand Date**	**Peak Demand Hour**	**Demand[1] (MW)**	**WRA Peak Demand Scenarios[2] (MW)**	**Generation[1] (MWh)**	**Transfers[1] (MW)**	**Wind – Actual[1] (MWh)**	**Wind – Expected[3] (MW)**	**Solar – Actual[1] (MWh)**	**Solar – Expected[3] (MW)**	**Forced Outages Summary[4] (MW)**

Table Notes:

[1] Actual demand, wind, and solar values for the hour of peak demand in U.S. areas were obtained from EIA From 930 data. For areas in Canada, this data was provided to NERC by system operators and utilities.

[2] See NERC *2024–2025* WRA demand scenarios for each assessment area. Values are the normal winter peak demand forecast and an extreme peak demand forecast that represents a 90/10, or once-per-decade, peak demand. Some areas use other basis for extreme peak demand.

[3] Expected values of wind and solar resources from the *2024–2025 WRA*.

[4] Values from NERC Generator Availability Data System for the 2024–2025 winter hour of peak demand in each assessment area. Highlighted areas had actual forced outages that were more than twice the value for typical forced outage rates used in the 2024–2025 winter risk period scenarios in the *2024–2025 WRA*.

[5] Texas RE-ERCOT peak demand scenarios are obtained by adding expected demand response (5.4 GW for winter 2024-2025) to the demand scenarios found on p. 29 of the 2024-2025 WRA.

*Canadian assessment areas report to the NERC Generator Availability Data System on a voluntary basis, which can contribute to the absence of some values in certain assessment areas.

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 145
NERC Email

Subject: Announcement | NERC 2025-2026 Winter Reliability Assessment | Rising Demand, Evolving Resources Continue to Challenge Winter Grid Reliability
Date: Tuesday, November 18, 2025 at 2:02:44 PM Eastern Standard Time
From: NERC Communications Announcements (Do Not Reply) (SM)
To: Rachel Sherrard
Attachments: image007.jpg, image008.png, image009.png, image010.png, image002.png

CAUTION: This is an External email. Please send suspicious emails to abuse@michigan.gov

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Announcement

Rising Demand, Evolving Resources Continue to Challenge Winter Grid Reliability

Full Announcement | 2025-2026 Winter Reliability Assessment | Infographic | Video

WASHINGTON, D.C.— NERC's *2025–2026 Winter Reliability Assessment* (WRA) finds that much of North America is again at an elevated risk of having insufficient energy supplies to meet demand in extreme operating conditions. Although resources are adequate for normal winter peak demand, any prolonged, wide-area cold snaps will be challenging. This is largely due to rising electricity demand, which has grown by 20 GW since last winter, significantly outpacing winter on-peak capacity. This, coupled with the changing resource mix, is affecting the winter outlook.

Undertaken annually in coordination with the Regional Entities, NERC's WRA examines multiple factors that collectively provide deep and unique insights into reliability risk. These factors include resource adequacy, encompassing reserve margins and scenarios to identify operational risk; fuel assurance; and preparations to mitigate reliability concerns.

For more information or assistance, please contact NERC Communications

www.nerc.com

RELIABILITY | RESILIENCE | SECURITY

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 147
Schahfer 2024 Groundwater Monitoring Report

2024 Annual Groundwater Monitoring and Corrective Action Report - Waste Disposal Area

NIPSCO LLC R. M. Schahfer Generating Station

Prepared Pursuant to 40 CFR §257.90(e) and Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

Submitted to:

Northern Indiana Public Service Company LLC
R.M. Schahfer Generating Station
Wheatfield, Indiana

Submitted by:

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January 31, 2025

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1.0 INTRODUCTION

On behalf of Northern Indiana Public Service Company LLC (NIPSCO), WSP USA Inc. (WSP) prepared this 2024 Annual Groundwater Monitoring and Corrective Action Report (2024 Annual Report) for the Rollin M. Schahfer Generating Station (RMSGS, Schahfer) coal combustion residuals (CCR) surface impoundment known as the Waste Disposal Area (WDA, the CCR Unit). WSP prepared the 2024 Annual Report in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule” (CCR Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

In conformance with the applicable requirements of 40 CFR §257.90(e)(1) through (5) and corresponding State of Indiana requirements, the 2024 Annual Report:

- Documents the status of the groundwater monitoring and corrective action program
- Provides figures showing the CCR Unit, monitoring well locations, and groundwater flow direction(s)
- Summarizes key CCR Rule groundwater activities completed during calendar year 2024
- Includes CCR Rule groundwater monitoring data obtained in calendar year 2024
- Describes any problems encountered during the monitoring activities
- Discusses actions taken to resolve the problems, if applicable
- Projects key activities for the upcoming year.

2.0 SUBJECT CCR UNIT

RMSGS is located at 2723 E 1500 N, Wheatfield, Jasper County, Indiana (Latitude 41° 12' 36" and Longitude 87° 01' 48", see Figure 1). As shown in Figure 2, the WDA is an approximately 80-acre impoundment located in the southwest portion of the RMSGS facility.

The CCR Unit is currently in Assessment Monitoring pursuant to 40 CFR §257.95. Routine monitoring activities performed during the reporting period include inspection of wells for integrity and security, measurement of groundwater levels prior to sample collection to assess groundwater flow direction, and collection of groundwater samples for laboratory analysis.

3.0 GROUNDWATER MONITORING AND CORRECTIVE ACTION PROGRAM - OVERVIEW OF CURRENT STATUS

In 2016, NIPSCO/WSP installed a 40 CFR §257.91-compliant groundwater monitoring system (Table 1). Beginning in 2016 and continuing throughout calendar year 2017, WSP collected background groundwater samples and performed Detection Monitoring at the CCR Unit pursuant to the requirements of 40 CFR §257.93-94.

Following Detection Monitoring and the determination of statistically significant increases (SSIs) over background levels of one or more Appendix III constituents, NIPSCO established an Assessment Monitoring program in January 2018 pursuant to the requirements of 40 CFR §257.95 to assess the nature and extent and overall groundwater quality farther downgradient of the WDA.

In 2018, WSP performed the first and second Assessment Monitoring events. Following the first Assessment Monitoring event, including verification sampling, NIPSCO posted a notification to the publicly accessible website of detections of Appendix IV constituents at concentrations above applicable groundwater protection standards (GWPSs) downgradient of the WDA.

In November 2018, WSP prepared an alternative source demonstration (ASD) indicating that the detections of Appendix IV parameters downgradient of the WDA are not due to a release from the WDA.

Subsequent to the ASD, WSP performed the following additional Assessment Monitoring events:

- Third and fourth Assessment Monitoring events in 2019
- Fifth and sixth Assessment Monitoring events in 2020
- Seventh and eighth Assessment Monitoring events in 2021
- Ninth and tenth Assessment Monitoring events in 2022
- Eleventh and twelfth Assessment Monitoring events in 2023
- Thirteenth and fourteenth Assessment Monitoring events in 2024

The thirteenth and fourteenth Assessment Monitoring events were completed in April and September 2024.

For April and September 2024 Assessment Monitoring event, WSP calculated the groundwater elevations from static water level measurements and prepared groundwater elevation contour maps. The static water level measurements and calculated groundwater elevations for the April (water levels measured in March) and September 2024 events are presented in Table 2, and the groundwater elevation contours from those events are presented in Figures 3 and 4, respectively.

For the April and September 2024 Assessment Monitoring events, WSP summarized the sampling activities associated with the events in Table 3. Table 3 includes the sampling dates, number of groundwater samples collected from each background and downgradient well, and the purpose of sampling associated with each event. WSP summarized the analytical results from these events in Table 4.

The WDA began and ended the current annual reporting period in Assessment Monitoring pursuant to 40 CFR §257.95. WSP identified Appendix IV constituents at statistically significant levels (SSLs) in 2024 that included molybdenum and lithium in groundwater samples collected from well GAMW-51B and GAMW-60B, and arsenic in well GAMW-44.

Pursuant to 40 CFR §257.94, in May and November 2024, a qualified Indiana-licensed professional engineer recertified the ASD indicating that the SSLs for molybdenum, lithium, and arsenic were not due to a release from the WDA, therefore, the CCR Unit remained in Assessment Monitoring. Based upon groundwater monitoring results collected pursuant to the CCR Rule to date, no corrective action program requirements as outlined in 40 CFR §257.96-98 have either been triggered or implemented at this CCR Unit.

3.1 Key Actions Completed - 2024

NIPSCO completed the following key actions relative to CCR Rule groundwater monitoring at the WDA during calendar year 2024:

- Preparation of the of 2023 Groundwater Monitoring and Corrective Action Annual Report in January 2024 (2023 Annual Report, WSP 2024a) (40 CFR §257.90(e))
- Evaluation of the results of the twelfth Assessment Monitoring event in February 2024 (40 CFR §257.95)
- Notification that Appendix IV constituents exceeded the GWPS in March 2024 (40 CFR §257.95(g))
- Performance of the thirteenth Assessment Monitoring event in April 2024 (40 CFR §257.95)
- Recertification of the ASD in May 2024 (WSP 2024c) (40 CFR §257.95(g))
- Evaluation of the results of the thirteenth Assessment Monitoring event in August 2024 (40 CFR §257.95)
- Notification that Appendix IV constituents exceeded the GWPS in September 2024 (40 CFR §257.95(g))
- Performance of the fourteenth Assessment Monitoring event in September 2024 (40 CFR §257.95)
- Recertification of the ASD in November 2024 (WSP 2024d) (40 CFR §257.95(g))

3.2 Monitoring System Modifications

In 2024, the WDA remained in Assessment Monitoring. Attached Table 1 provides a summary of the well rationale/purpose and date of installation. Figure 2 shows the well network for the WDA. Table 5 below provides an overview of the modified groundwater monitoring network.

Table 5: Overview of Groundwater Monitoring Network

Background Monitoring Wells	Downgradient Monitoring Wells	Assessment Monitoring Wells
GAMW-03, GAMW-03B, GAMW-68, and GAMW-68B	GAMW-01, GAMW-01B, GAMW-12, GAMW-12B, GAMW-13, GAMW-13B, GAMW-14, and GAMW-14B	GAMW-42, GAMW-42B, GAMW-42C, GAMW-43, GAMW-43B, GAMW-44, GAMW-44B, GAMW-51, GAMW-51B, GAMW-57, GAMW-57B, GAMW-58, GAMW-58B, GAMW-59, GAMW-59B, GAMW-60, GAMW-60B, and GAMW-77

WSP decommissioned, installed, developed, and surveyed the wells in accordance with the CCR Groundwater Monitoring Program Implementation Manual (GMPIM, Golder 2017)

3.3 Groundwater Flow

As noted above, WSP tabulated the March and September 2024 static water measurements and calculated groundwater elevations in Table 2 and prepared the groundwater elevation contour maps for March and September (See Figures 3 and 4) using calculated groundwater elevations. Based on these elevations and contour maps and consistent with the requirements of the CCR Rule, WSP determined the rate and direction of groundwater flow within the uppermost aquifer after each sampling event.

Overall site groundwater flow direction is northeast towards the Kankakee River. In March and September 2024, groundwater flowed toward the northwest in the vicinity of the WDA (Figure 3 and Figure 4). The groundwater elevation, in the vicinity of the WDA, varies between approximately 655 to 665 feet North American Vertical Datum of 1988 (NAVD88) with a depth to groundwater less than 10 feet below ground surface.

WSP calculated the hydraulic gradient in the vicinity of the CCR units at 1.17E-03 feet per foot. Using an assumed porosity value of 30 percent, the average hydraulic conductivity from slug tests for the shallow unconfined aquifer of 93.5 feet per day, and the calculated gradient, WSP calculated the average rate of groundwater flow to be approximately 133 feet per year (Groundwater Monitoring System Design Manual [GMSDM], WSP 2024b).

3.4 Background Monitoring (2016 to 2017)

Per the requirements of 40 CFR §257.94, WSP collected eight independent background groundwater samples from each background and downgradient well between July 2016 and August 2017. WSP used the results of the background monitoring phase to develop appropriate, statistically valid background values for each constituent/monitoring well. WSP submitted the samples to a contract laboratory, in accordance with chain of custody and quality assurance/quality control procedures, for analysis of Appendix III and Appendix IV constituents. In addition, WSP personnel measured field water quality parameters including specific conductance, temperature, dissolved oxygen, turbidity, oxidation-reduction potential, and pH. The background data set was included in the 2017 CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2018 (2017 Annual Report, Golder 2018a).

WSP performed a periodic update of background datasets, which includes incorporation of additional background data, to improve statistical power and accuracy by providing a more conservative estimate of the true background populations. The CCR Rule Groundwater Monitoring Program Implementation Manual (GMPIM, Golder 2017) allows for the statistical limits to be updated after four to eight new measurements are available (i.e., every two to four years of semi-annual monitoring). WSP incorporated the new data into the background dataset and updated the GWPS in both March 2020 and September 2022.

3.5 Detection Monitoring

WSP performed the first Detection Monitoring event in October 2017, followed by the statistical evaluation and data analysis in January 2018. WSP collected groundwater samples from the CCR Unit background and downgradient monitoring wells for analysis of Appendix III constituents per 40 CFR §257.94 and included the results in the 2017 Annual Report (Golder 2018a). Following receipt and validation of laboratory results, WSP evaluated the results of the first Detection Monitoring sampling event to compare the concentrations of Appendix III constituents to facility background concentrations.

Using Sanitas™ software, WSP pooled the background data to calculate prediction limits and compared the October 2017 results to the calculated prediction limits to identify SSIs. Based on that comparison, WSP established an Assessment Monitoring program in April 2018.

3.6 Assessment Monitoring

WSP performed the first Assessment Monitoring event (i.e., Assessment and Verification sampling) in March and April 2018, followed by a statistical evaluation and data analysis in August 2018. In March 2018, WSP collected groundwater samples from each background and downgradient monitoring well for analysis of Appendix IV constituents per 40 CFR §257.95. In April 2018, WSP collected groundwater samples from the downgradient monitoring well locations for analysis of Appendix III and detected Appendix IV constituents per 40 CFR §257.95.

In August 2018, WSP developed CCR Unit-specific GWPS for comparisons with the Assessment Monitoring results. At the time of the GWPS development, the GWPS was the higher value of either the Maximum Contaminant Level (MCL) or the CCR Unit-specific background concentration for each analyte calculated using a tolerance/prediction limit procedure in accordance with 40 CFR §257.95(h)(2).

Following receipt and validation of laboratory results, WSP evaluated the Appendix IV constituent results relative to CCR Unit-specific GWPSs (Table 6). Results from the downgradient monitoring wells were evaluated by comparing the lower confidence limit (LCL) to the CCR Unit-specific GWPS for each Appendix IV analyte at each well. If the LCL exceeded the GWPS, there is statistical evidence of an SSL. WSP determined that SSLs existed for the WDA in 2018, specifically molybdenum at GAMW-01, GAMW-13B, and GAMW-14B, but identified an alternative natural source for the elevated levels of molybdenum detected in downgradient monitoring wells and prepared an ASD. A qualified Indiana-licensed professional engineer certified the ASD in November 2018 (Appendix A of the 2018 CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2019 (2018 Annual Report, Golder 2019a)).

Following the initial Assessment Monitoring event, WSP performed thirteen additional Assessment Monitoring events at the WDA by collecting groundwater samples from each background and downgradient monitoring well per 40 CFR §257.95. In addition, WSP performed boundary well sampling in 2018 and 2019. Those sample events and their results are summarized below:

- Second Assessment Monitoring Event – WSP performed the second Assessment Monitoring event in October 2018 by collecting groundwater samples for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in February 2019. WSP identified SSLs for arsenic (GAMW-01) and cobalt (GAMW-14). In May 2019, WSP prepared, and a qualified Indiana-licensed professional engineer certified an ASD demonstrating that the arsenic and cobalt concentrations observed in the downgradient monitoring wells were due to natural variation and not a release from the WDA (Appendix A of the 2019 CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2020 (2019 Annual Report, Golder 2020a))). The results from the first and second Assessment Monitoring events are included in the 2018 Annual Report (Golder 2019a).
- Third Assessment Monitoring Event – WSP performed the third Assessment Monitoring event in April 2019 by collecting groundwater samples for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in August 2019. The results confirmed the SSLs for arsenic (GAMW-01) and cobalt (GAMW-14). A qualified-licensed professional engineer recertified the ASD in November 2019 (Appendix B of the 2019 Annual Report, Golder 2020a)).

WSP collected groundwater samples from the following property boundary Assessment Monitoring wells (see Figure 2):

- GAMW-42/42B, GAMW-43/43B, and GAMW-44/44B installed in July 2018 were sampled in March, April, June, July, August, October, and November 2019
- GAMW-42C, GAMW-57/57B, and GAMW-58/58B installed in June 2019 were sampled in July, August, October, and November 2019.

SSLs were not identified in groundwater samples collected from these property boundary wells. The boundary wells have been included in the routine semi-annual sampling since 2020.

- Fourth Assessment Monitoring Event – WSP performed the fourth Assessment Monitoring event in November 2019 by collecting groundwater samples for analysis of Appendix III and detected Appendix IV constituents and performed the statistical evaluation of the analytical results in March 2020. WSP identified an SSL for molybdenum in well GAMW-51B. In June 2020, WSP prepared, and a qualified Indiana-licensed professional engineer certified, an ASD demonstrating that the SSL for molybdenum and observed lithium

levels above the GWPS in GAMW-51B were not due to a release from the WDA (Appendix A of the 2020 CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2021 (2020 Annual Report, Golder 2021a)). The results from the third and fourth Assessment Monitoring events and the 2019 boundary sampling are included in the 2019 Annual Report (Golder 2020a).

- Fifth Assessment Monitoring Event – WSP performed the fifth Assessment Monitoring event in April/May 2020 by collecting groundwater samples for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in September 2020. WSP identified SSLs for molybdenum and lithium in well GAMW-51B. As these results were consistent with the previous Assessment Monitoring event, a qualified Indiana-licensed professional engineer recertified the ASD in December 2020 (Appendix B of the 2020 Annual Report, Golder 2021a).
- Sixth Assessment Monitoring Event – WSP performed the sixth Assessment Monitoring event in October 2020 by collecting groundwater samples for analysis of Appendix III and detected Appendix IV constituents and performed the statistical evaluation of the analytical results in February 2021. WSP identified SSLs for molybdenum and lithium in well GAMW-51B and molybdenum in GAMW-60B. As described in the 2019 Annual Report (Golder 2020a), GAMW-60B was installed downgradient of GAMW-51/51B in 2019 to further assess the nature and extent of groundwater quality further downgradient of the WDA. The October 2020 Assessment Monitoring event was the fourth round of sampling at this location, and therefore, was the first event for which SSLs were calculated. As these results are consistent with the primary lines of evidence presented in the June 2020 ASD, a qualified Indiana-licensed professional engineer recertified the ASD in May 2021 (Appendix A of the 2021 CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2022 (2021 Annual Report, Golder 2022a)). The results from the fifth and sixth Assessment Monitoring events are included in the 2020 Annual Report (Golder 2021a).
- Seventh Assessment Monitoring Event – WSP performed the seventh Assessment Monitoring event in April 2021 by collecting groundwater samples for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in August 2021. WSP identified SSLs for molybdenum and lithium in well GAMW-51B and molybdenum in GAMW-60B. As these results were consistent with the previous Assessment Monitoring event, a qualified Indiana-licensed professional engineer recertified the ASD in November 2021 (Appendix B of the 2021 Annual Report, Golder 2022a).
- Eighth Assessment Monitoring Event – WSP performed the eighth Assessment Monitoring event in September 2021 by collecting groundwater samples for analysis of Appendix III and detected Appendix IV constituents and performed the statistical evaluation of the analytical results in January 2022. The results confirmed the SSLs for molybdenum and lithium in well GAMW-51B and molybdenum in GAMW-60B. A qualified Indiana-licensed professional engineer recertified the ASD in April 2022 (Appendix A of the 2022 CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2023 (2022 Annual Report, WSP 2023a)). The results from the seventh and eighth Assessment Monitoring events are included in the 2021 Annual Report (Golder 2022a).
- Ninth Assessment Monitoring Event – WSP performed the ninth Assessment Monitoring event in May/June 2022 by collecting groundwater for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in September 2022. The results confirmed the SSLs for molybdenum and lithium in well GAMW-51B and molybdenum in GAMW-60B. A qualified Indiana-licensed professional engineer recertified the ASD in December 2022 (Appendix B of the 2022 Annual Report, WSP 2023a).

- Tenth Assessment Monitoring Event – WSP performed the tenth Assessment Monitoring event in October/November 2022 by collecting groundwater samples for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in February 2023. The results confirmed the SSLs for molybdenum and lithium in well GAMW-51B and molybdenum in GAMW-60B. A qualified Indiana-licensed professional engineer recertified the ASD in May 2023 (Appendix A of the 2023 CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2024 (2023 Annual Report, WSP 2024a)). The results from the ninth and tenth Assessment Monitoring events are included in the 2022 Annual Report (WSP 2023a).
- Eleventh Assessment Monitoring Event – WSP performed the eleventh Assessment Monitoring event in April/May 2023 by collecting groundwater samples for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in August 2023. The results confirmed the SSLs for molybdenum and lithium in well GAMW-51B and molybdenum in GAMW-60B. The results also indicated a new SSL for arsenic at GAMW-44. WSP prepared, and a qualified Indiana-licensed professional engineer certified, an ASD demonstrating that the SSL for arsenic observed at levels above the GWPS in GAMW-44 were not due to a release from the WDA (Appendix B of the 2023 Annual Report, WSP 2024a). Furthermore, NIPSCO installed an additional monitoring well GAMW-77 downgradient of and closer to the property boundary than GAMW-44 to further evaluate downgradient groundwater quality.
- Twelfth Assessment Monitoring Event – WSP performed the twelfth Assessment Monitoring event in September/October 2023 by collecting groundwater samples for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in February 2024. The results confirmed the SSLs for molybdenum and lithium in well GAMW-51B, molybdenum in GAMW-60B, and arsenic in well GAMW-44. The results also indicated a new SSL for lithium in well GAMW-60B. As these results are consistent with the primary lines of evidence presented in the June 2020 ASD, a qualified Indiana-licensed professional engineer recertified the ASD in May 2024 (Appendix A). The results from the ninth and tenth Assessment Monitoring events are included in the 2023 Annual Report (WSP 2024a).
- Thirteenth Assessment Monitoring Event – WSP performed the thirteenth Assessment Monitoring event in April 2024 by collecting groundwater samples for analysis of Appendix III and Appendix IV constituents and performed the statistical evaluation of the analytical results in August 2024. The results confirmed the SSLs for lithium and molybdenum in wells GAMW-51B and GAMW-60B and for arsenic in well GAMW-44. A qualified Indiana-licensed professional engineer recertified the ASD in November 2024 (Appendix B).
- Fourteenth Assessment Monitoring Event – WSP performed the fourteenth Assessment Monitoring event in September 2024 by collecting groundwater samples for analyses of Appendix III and Appendix IV constituents and will perform the statistical evaluation of the analytical results in January 2025.

The analytical laboratory reports for April and September 2024 are provided in Appendix C and Appendix D, respectively. The data usability assessment report for the analytical data is provided in Appendix E. The February and August 2024 statistical evaluation results are provided in Appendix F.

3.7 Statistical Evaluation

In accordance with 40 CFR §257.95, WSP performed the statistical evaluation of the groundwater analytical results following each monitoring event. For this evaluation, WSP utilized the Sanitas™ statistical analysis software package. The methods used during this statistical evaluation are described in the GMPIM (Golder 2017),

were certified by a qualified engineer in October 2017. WSP has summarized the statistical evaluations in the subsections below.

3.7.1 Data Evaluation

After each event, WSP assessed the analytical data for outliers, anomalies, and trends that might be an indication of a sampling or analytical error. Outliers and anomalies are generally defined as inconsistently large or small values that can occur because of sampling, laboratory, transportation, or transcription errors, or even by chance alone. Significant trends may indicate natural geochemical variability, a source of systematic error, influence of an upgradient/off-site source, or an actual occurrence of CCR Unit influence upon groundwater quality. Prior to the calculation of statistical limits, WSP used appropriate statistical methods to remove outliers from the database and manage trends with detrending routines.

To assess the data for outliers, anomalies, and trends, WSP assessed the data using time vs. concentration graphs, and statistical routines included in the Sanitas™ statistical analysis software package.

Outliers and Anomalies

Based on these evaluations, WSP identified outliers in 2024 in addition to those identified in the 2023 Annual Report:

- The April 2023 pH results collected from monitoring wells GAMW-68, GAMW-68B, GAMW-43, and GAMW-43B.

These results were identified as outliers and removed from the dataset for the following reasons:

- Generally, statistical testing, including the Dixon outlier test (see Appendix F), identified the results as outliers
- Trend charts indicate that these results were inconsistent with other concentrations detected in these wells and the high results were not confirmed by the October 2023 data
- A malfunction in field equipment is the suspected cause of the anomalous data.

Trends

WSP evaluated the background data set for trends using Sanitas™ software (Appendix F). WSP will continue to monitor all trends and apply detrending routines, if applicable, before using these data to calculate GWPS. WSP identified the following Appendix IV parameter trends in background monitoring wells:

- Arsenic concentrations detected in groundwater samples collected from GAMW-03B show a decreasing trend. Arsenic has never been detected above the MCL in this well. No detrending routines are required.
- Arsenic concentrations detected in groundwater samples collected from GAMW-68 and GAMW-68B show an increasing trend. Arsenic has never been detected above the MCL in these wells. No detrending routines are required.
- Beryllium concentrations detected in groundwater samples collected from GAMW-03 and GAMW-03B show a decreasing trend. Beryllium has never been detected above the MCL in these wells. No detrending routines are required.

- Cadmium concentrations detected in groundwater samples collected from GAMW-03 and GAMW-03B show a decreasing trend. Cadmium has never been detected above the MCL in these wells. No detrending routines are required.
- Chromium concentrations detected in groundwater samples collected from GAMW-03 show a decreasing trend. Chromium has never been detected above the MCL in this well. No detrending routines are required.
- Lead concentrations detected in groundwater samples collected from GAMW-03 and GAMW-03B show a decreasing trend. Lead has never been detected above the health-based standard in these wells. No detrending routines are required.
- Molybdenum concentrations detected in groundwater samples collected from GAMW-03B show a decreasing trend. Molybdenum has never been detected above the health-based standard in this well. No detrending routines are required.
- Selenium concentrations detected in groundwater samples collected from GAMW-03B show a decreasing trend. Selenium has never been detected above the MCL in this well. No detrending routines are required.
- Thallium concentrations detected in groundwater samples collected from GAMW-03 and GAMW-03B show a decreasing trend. Thallium has never been detected above the MCL in these wells. No detrending routines are required.

3.7.2 Development of Groundwater Protection Standard

Pursuant to CFR §257.95(h), WSP developed GWPS for each of the Appendix IV analytes. The GWPSs are set equal to the MCL or health-based standard or a limit based on background data, whichever is greater, as described in 40 CFR §257.95(h)(2).

The CCR Rule and *Unified Guidance* provide two acceptable approaches for establishing a background-based GWPS; a tolerance interval approach or a prediction interval approach. Either of these approaches can be used in all cases except if all values are non-detect, in which case the background-based GWPS is set equal to the laboratory reporting limit (RL).

If the background dataset is normally or transformed normally distributed, the GMPIM (Golder 2017) states that the tolerance interval approach is used. The background-based GWPS will be based on a 95 percent coverage/95 percent confidence tolerance interval. If the background data are non-normal (even after transformation) than a non-parametric prediction interval approach is used.

As described in Section 3.4, WSP performed a periodic update of background datasets. This update included incorporation of additional background data, to improve statistical power and accuracy by providing a more conservative estimate of the true background populations. The GMPIM (Golder 2017) allows for the statistical limits to be updated after four to eight new measurements are available (i.e., every two to four years of semi-annual monitoring). WSP incorporated the new data into the background dataset and updated the GWPS in both March 2020 and September 2022 (see Table 6). The September 2022 GWPS include the first four data points collected from GAMW-68 and GAMW-68B. A summary of the GWPSs is provided in Table 6. The corresponding tolerance limits and/or prediction limits are provided in Appendix F.

3.7.3 Results of Appendix IV Downgradient Statistical Comparisons

For Assessment Monitoring results, WSP used an interwell statistical evaluation to identify SSLs. An interwell evaluation compares the most recent values from downgradient compliance wells to a background dataset composed of upgradient well data. Because the CCR Unit is in Assessment Monitoring, no statistical evaluations were conducted on Appendix III (Detection Monitoring) constituents.

For Appendix IV constituents, WSP used the confidence interval method to evaluate for potential exceedances or SSLs based on procedures described in the Unified Guidance, and the GMPIM (Golder 2017). Using confidence intervals, SSLs are identified by comparing the calculated confidence interval against the GWPS. A confidence interval statistically defines the upper and lower bounds of a specified population within a stipulated level of confidence. If the lower confidence limit exceeds the GWPS, there is statistical evidence that an SSL has been triggered.

Based on the comparisons discussed above, WSP determined that the results of the statistical analyses completed in February 2024 and August 2024 identified SSLs for lithium in well GAMW-51B and molybdenum in wells GAMW-51B and GAMW-60B. Additionally, trend analysis indicated that there are statistically significant increasing trends for arsenic in well GAMW-44 and lithium in well GAMW-60B and in both cases the lower confidence band is above the GWPS, resulting in SSLs for these locations. The calculated confidence intervals and confidence band for arsenic at GAMW-44 and lithium at GAMW-60B are provided in Appendix F.

3.8 Problems Encountered and Follow-Up Corrective Actions

In the Thirteenth Assessment Monitoring event (April 2024); WSP collected the following groundwater samples with higher than expected turbidity levels:

- GAMW-03; 7.10 nephelometric turbidity units (NTUs)
- GAMW-12B; 5.30 NTUs
- GAMW-42C; 11.60 NTUs
- GAMW-43; 5.11 NTUs
- GAMW-44; 18.80 NTUs
- GAMW-51; 41.80 NTUs.

In the Fourteenth Assessment Monitoring event (September 2024); WSP collected the following groundwater samples with higher than expected turbidity levels:

- GAMW-42B; 9.74 NTUs
- GAMW-42C; 99.79 NTUs

According to the GMPIM (Golder 2017), groundwater samples are to be collected once groundwater has achieved a turbidity level below 5 NTUs. If the 5 NTU objective cannot be achieved due to time constraints in the field, groundwater is then purged for a minimum of two hours and sampled when turbidity appears to stabilize (e.g., no downward or upward trend over three consecutive readings five minutes apart).

WSP's evaluation of the analytical results from these wells suggests that the slightly elevated turbidity levels had no significant effect on the representativeness of groundwater quality.

During future monitoring events, WSP will purge groundwater for a minimum of two hours or five well volumes and then use professional judgement to assess when the purge water is representative of groundwater to be sampled. If an acceptable turbidity level cannot be achieved within a reasonable timeframe (e.g., three hours maximum), WSP will redevelop the affected monitoring well(s) prior to the next sampling event.

4.0 KEY ACTIVITIES PROJECTED FOR 2025

During calendar year 2025, NIPSCO anticipates conducting the following key CCR Rule groundwater monitoring activities for the WDA:

- Prepare and submit the appropriate notifications according to the CCR Rule
- Continue semi-annual Assessment Monitoring groundwater sampling per CCR Rule requirements
- Inspect and maintain the monitoring system including wells, pumps, and equipment.

5.0 REFERENCES

Golder 2017, “CCR Groundwater Monitoring Program Implementation Manual,” Golder Associates Inc., October 2017.

Golder 2018a, “2017 Annual Groundwater Monitoring and Corrective Action Report - Waste Disposal Area, NIPSCO R. M. Schafer Generating Station”, Golder Associates Inc., January 31, 2018.

Golder 2018b, “Waste Disposal Area Alternative Source Demonstration,” Golder Associates Inc., November 19, 2018.

Golder 2019a, “2018 Annual Groundwater Monitoring and Corrective Action Report - Waste Disposal Area, NIPSCO R. M. Schafer Generating Station”, Golder Associates Inc., January 31, 2019.

Golder 2019b, “Alternative Source Demonstration - Waste Disposal Area,” Golder Associates Inc., May 17, 2019.

Golder 2019c, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” Golder Associates Inc., November 26, 2019.

Golder 2020a, “2019 Annual Groundwater Monitoring and Corrective Action Report - Waste Disposal Area, NIPSCO R. M. Schafer Generating Station”, Golder Associates Inc., January 31, 2020.

Golder 2020b, “Alternative Source Demonstration – Waste Disposal Area,” Golder Associates Inc., June 9, 2020.

Golder 2020c, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” Golder Associates Inc., December 4, 2020.

Golder 2021a, “2020 Annual Groundwater Monitoring and Corrective Action Report – Waste Disposal Area, NIPSCO R. M. Schahfer Generating Station”, Golder Associates Inc., January 31, 2021.

Golder 2021b, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” Golder Associates Inc., May 18, 2021.

Golder 2021c, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” Golder Associates Inc., November 12, 2021.

Golder 2022a, 2021, “2021 Annual Groundwater Monitoring and Corrective Action Report – Waste Disposal Area, NIPSCO R. M. Schahfer Generating Station”, Golder Associates Inc., January 31, 2022.

Golder 2022b, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” Golder Associates Inc., April 15, 2022.

Golder 2022c, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” Golder Associates Inc., December 2, 2022.

WSP 2023a, “2022 Annual Groundwater Monitoring and Corrective Action Report – Waste Disposal Area, NIPSCO R. M. Schahfer Generating Station”, WSP USA Inc., January 31, 2023.

WSP 2023b, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” WSP USA Inc., May 8, 2023.

WSP 2023c, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” WSP USA Inc., November 17, 2023.

WSP 2024a, “2023 Annual Groundwater Monitoring and Corrective Action Report – Waste Disposal Area, NIPSCO R. M. Schahfer Generating Station”, WSP USA Inc., January 31, 2024.

WSP 2024b. “CCR Groundwater Monitoring System Design Manual,” WSP USA Inc., July 2024.

WSP 2024c, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” WSP USA Inc., March 25, 2024.

WSP 2024d, “Recertification of R. M. Schahfer Waste Disposal Area Alternative Source Demonstration,” WSP USA Inc., October 15, 2024.

Tables

Table 1: Monitoring Well Network
CCR Unit Schahfer Waste Disposal Area
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

CCR Unit	Well Purpose	Monitoring Well ID	Installation Date	Decommission Date (If Applicable)	Basis For Action
Waste Disposal Area	Background Monitoring Well	GAMW-03	6/27/2015	-	Installed for groundwater quality monitoring(1)
		GAMW-03B	5/24/2016	-	
		GAMW-68	8/27/2020	-	
		GAMW-68B	8/27/2020	-	
	Downgradient Monitoring Well	GAMW-01	6/26/2015	-	Installed for groundwater quality monitoring(1)
		GAMW-12	5/23/2016	-	
		GAMW-13	5/24/2016	-	
		GAMW-13B	5/23/2016	-	
		GAMW-14	5/23/2016	-	
		GAMW-14B	5/23/2016	-	
		GAMW-01B	7/31/2018	-	Installed to characterize the nature and extent of a potential release(2)
		GAMW-12B	7/31/2018	-	
		GAMW-51	7/25/2018	-	
		GAMW-51B	7/25/2018	-	
		GAMW-42	7/24/2018	-	Installed to monitor groundwater quality at the property boundary(3)
		GAMW-42B	7/24/2018	-	
		GAMW-42C	6/8/2019	-	
		GAMW-43	5/16/2018	-	
		GAMW-43B	5/16/2018	-	
		GAMW-44	5/16/2018	-	
		GAMW-44B	5/16/2018	-	
		GAMW-57	6/7/2019	-	
		GAMW-57B	6/7/2019	-	
		GAMW-58	6/6/2019	-	
		GAMW-58B	6/6/2019	-	
		GAMW-59	6/8/2019	-	Installed to characterize the nature and extent of a potential release(2)
		GAMW-59B	6/6/2019	-	
		GAMW-60	6/8/2019	-	
		GAMW-60B	6/4/2019	-	
		GAMW-77	11/10/2023	-	Installed to monitor groundwater quality at the property boundary(3)

1) Per 40 CFR §257.93, WSP collected eight rounds of background data prior to October 17, 2017, excluding wells GAMW-68 and GAMW-68B.
2) Per 40 CFR §257.95(g)(1)(i) Rule requirements, WSP collected additional data to further characterize the nature and extent of potential groundwater impacts.
3) Per 40 CFR §257.95(g)(1)(iii), WSP collected data to monitor groundwater quality in the direction of flow at the property boundary.

Prepared by: MJS 11/20/2024
Checked by: DFSC
Reviewed by: JBG

Table 2: 2024 Groundwater Elevations
CCR Unit Schahfer Waste Disposal Unit
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Monitoring Well Location	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft-NAVD88)	Measurement Date		Well Diameter (in)	Stickup (ft)	2024-03-13		2024-09-03	
				Screen Interval Top (ft-bgs)	Screen Interval Bottom (ft-bgs)			Depth to Water (ft-btoc)	Groundwater Elevation (ft-NAVD88)	Depth to Water (ft-btoc)	Groundwater Elevation (ft-NAVD88)
Davis Ditch South Culvert	2168387.49	2971366.64	662.83	-	-	-	-	2.95	659.88	3.45	659.38
GAMW01	2169108.22	2968518.99	668.23	5	15	2	3.29	9.24	658.99	9.90	658.33
GAMW01B	2169107.37	2968525.20	667.87	26	36	2	2.67	8.77	659.10	9.42	658.45
GAMW02	2168720.88	2970548.50	669.57	5	15	2	3.49	9.56	660.01	10.23	659.34
GAMW03	2169821.53	2971646.34	668.20	5	15	2	3.06	5.41	662.79	8.65	659.55
GAMW03B	2169813.71	2971647.06	668.16	25	35	2	2.87	5.41	662.75	8.70	659.46
GAMW04	2170947.82	2971503.36	669.24	5	15	2	3.43	6.92	662.32	9.50	659.74
GAMW05	2170870.00	2968721.92	669.75	7	17	2	3.06	10.76	658.99	11.91	657.84
GAMW06	2172320.06	2969128.60	670.81	5	15	2	3.31	11.44	659.37	11.93	658.88
GAMW07	2172327.53	2970256.34	669.94	5	15	2	3.39	10.23	659.71	10.66	659.28
GAMW08	2173335.20	2970799.89	669.76	5	15	2	3.81	10.08	659.68	10.64	659.12
GAMW08B	2173334.70	2970790.59	668.47	26	36	2	2.55	8.83	659.64	9.41	659.06
GAMW09	2172509.36	2971291.29	668.56	5	15	2	3.46	7.98	660.58	9.07	659.49
GAMW09B	2172502.57	2971291.67	668.29	25	35	2	2.94	7.62	660.67	8.73	659.56
GAMW10	2173531.42	2973046.25	667.83	5	15	2	3.84	9.20	658.63	9.79	658.04
GAMW11	2174218.62	2972678.78	667.17	5	15	2	3.57	8.74	658.43	9.24	657.93
GAMW12	2169576.84	2968314.48	667.29	5	15	2	2.94	8.68	658.61	9.30	657.99
GAMW12B	2169580.32	2968309.54	666.81	25	35	2	2.58	8.05	658.76	8.66	658.15
GAMW13	2170059.98	2968285.46	667.24	5	15	2	2.93	8.77	658.47	9.30	657.94
GAMW13B	2170055.88	2968285.69	667.12	25	35	2	2.89	8.65	658.47	9.37	657.75
GAMW14	2170532.49	2968467.96	667.96	5	15	2	3.20	9.10	658.86	9.10	658.86
GAMW14B	2170534.66	2968471.60	667.94	25	35	2	3.32	9.14	658.80	10.17	657.77
GAMW15	2172753.76	2970258.35	668.25	5	15	2	3.24	8.70	659.55	9.16	659.09
GAMW15B	2172749.68	2970258.92	668.05	25	35	2	2.91	8.50	659.55	8.96	659.09
GAMW16BR	2173189.53	2970399.45	664.39	30	40	2	2.93	7.87	656.52	8.28	656.11
GAMW16R	2173189.51	2970396.68	667.17	10	20	2	2.82	7.72	659.45	8.15	659.02
GAMW17	2173164.44	2970944.07	671.93	5	15	2	3.12	12.17	659.76	12.80	659.13
GAMW17B	2173164.84	2970947.44	670.60	25	35	2	1.74	10.83	659.77	12.57	658.03
GAMW18	2171919.78	2971272.41	669.07	5	15	2	3.03	7.87	661.20	9.32	659.75
GAMW18B	2171910.00	2971272.53	668.47	25	35	2	2.53	7.04	661.43	8.50	659.97
GAMW20	2171579.62	2974761.60	667.21	6	16	2	2.60	8.67	658.54	8.60	658.61
GAMW20B	2171579.95	2974757.37	667.40	22.5	32.5	2	2.92	8.73	658.67	8.77	658.63
GAMW24	2171048.72	2974868.68	665.39	6	16	2	3.30	5.84	659.55	6.75	658.64
GAMW24B	2171050.67	2974866.89	665.33	21	31	2	3.20	5.65	659.68	6.55	658.78
GAMW25	2171586.03	2973730.34	668.05	6	16	2	2.79	8.53	659.52	9.01	659.04
GAMW25B	2171588.49	2973730.66	667.95	25	35	2	2.69	8.47	659.48	8.90	659.05
GAMW26	2172243.83	2973744.80	667.71	6	16	2	2.82	8.84	658.87	9.03	658.68
GAMW26B	2172245.87	2973744.66	667.75	23	33	2	2.84	8.86	658.89	9.03	658.72

Table 2: 2024 Groundwater Elevations
CCR Unit Schahfer Waste Disposal Unit
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Monitoring Well Location	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft-NAVD88)	Measurement Date		Well Diameter (in)	Stickup (ft)	2024-03-13		2024-09-03	
				Screen Interval Top (ft-bgs)	Screen Interval Bottom (ft-bgs)			Depth to Water (ft-btoc)	Groundwater Elevation (ft-NAVD88)	Depth to Water (ft-btoc)	Groundwater Elevation (ft-NAVD88)
GAMW27	2172624.68	2973958.32	665.51	6	16	2	2.83	7.17	658.34	7.41	658.10
GAMW27B	2172624.95	2973960.21	665.44	21	31	2	2.79	7.18	658.26	7.27	658.17
GAMW31	2174043.93	2974076.43	665.40	6	16	2	2.72	7.07	658.33	7.79	657.61
GAMW31B	2174041.68	2974075.83	665.41	20	30	2	2.72	7.03	658.38	7.75	657.66
GAMW32	2174364.59	2974353.14	668.08	8	18	2	2.64	9.63	658.45	10.35	657.73
GAMW32B	2174364.70	2974350.09	668.28	24	34	2	2.75	9.83	658.45	10.52	657.76
GAMW33	2174015.71	2976811.15	665.29	6	16	2	2.66	6.41	658.88	7.65	657.64
GAMW33B	2174015.85	2976814.01	665.29	21	31	2	2.86	6.50	658.79	7.60	657.69
GAMW34	2173123.80	2976637.58	664.82	4	16	2	3.04	5.85	658.97	6.86	657.96
GAMW34B	2173126.75	2976637.84	664.84	19	29	2	3.19	5.75	659.09	6.86	657.98
GAMW35B	2172046.64	2976576.97	664.62	14	24	2	2.84	5.31	659.31	6.39	658.23
GAMW36	2174145.14	2977866.72	665.00	6	16	2	2.76	5.60	659.40	7.60	657.40
GAMW36B	2174142.51	2977866.95	665.07	24.5	34.5	2	2.72	5.61	659.46	7.60	657.47
GAMW37B	2173307.54	2977852.54	665.32	15	25	2	2.64	5.70	659.62	7.33	657.99
GAMW42	2170186.91	2967937.39	665.80	5	15	2	2.68	6.97	658.83	7.97	657.83
GAMW42B	2170182.55	2967943.17	665.66	26	36	2	2.51	6.85	658.81	7.82	657.84
GAMW42C	2170207.09	2967974.69	666.30	40	50	2	3.09	7.53	658.77	8.49	657.81
GAMW43	2170878.63	2967926.92	665.59	5	15	2	2.45	6.80	658.79	8.02	657.57
GAMW43B	2170876.91	2967926.66	665.53	26	36	2	2.41	6.73	658.80	7.51	658.02
GAMW44	2171240.72	2967833.09	666.31	5	15	2	2.20	7.54	658.77	8.84	657.47
GAMW44B	2171239.72	2967834.35	666.25	26	36	2	2.14	7.52	658.73	8.80	657.45
GAMW45	2178836.29	2971287.41	664.50	5	15	2	2.29	8.00	656.50	9.60	654.90
GAMW45B	2178836.27	2971289.23	664.32	28	38	2	2.09	7.80	656.52	9.40	654.92
GAMW46	2178839.03	2973531.39	664.80	5	15	2	2.81	6.95	657.85	8.87	655.93
GAMW46B	2178838.97	2973532.88	664.79	22	32	2	2.81	6.92	657.87	8.84	655.95
GAMW48	2178605.72	2975279.25	663.38	5	15	2	2.57	6.30	657.08	8.15	655.23
GAMW48B	2178606.46	2975283.24	663.33	20	30	2	2.89	6.25	657.08	8.12	655.21
GAMW49	2176111.21	2976600.94	664.64	5	15	2	2.64	5.53	659.11	7.50	657.14
GAMW49B	2176115.76	2976600.61	664.52	23	33	2	2.40	5.53	658.99	7.30	657.22
GAMW50	2174957.14	2977953.35	665.15	5	15	2	2.65	5.98	659.17	7.92	657.23
GAMW50B	2174961.01	2977953.31	664.88	21	31	2	2.62	5.68	659.20	7.65	657.23
GAMW51	2171145.47	2968512.12	668.77	5	15	2	2.62	10.05	658.72	11.06	657.71
GAMW51B	2171147.99	2968515.78	668.79	27	37	2	2.76	9.87	658.92	10.92	657.87
GAMW52	2175030.90	2970079.13	666.79	5	15	2	2.72	8.22	658.57	8.95	657.84
GAMW52B	2175032.00	2970073.23	666.90	27	37	2	2.40	8.29	658.61	9.07	657.83
GAMW53	2174535.34	2971036.47	667.24	5	15	2	2.56	8.60	658.64	9.20	658.04
GAMW53B	2174536.54	2971032.60	667.29	26	36	2	2.67	8.63	658.66	9.17	658.12
GAMW54	2174080.28	2971911.36	666.37	5	15	2	2.50	6.91	659.46	7.87	658.50
GAMW54B	2174081.64	2971906.90	666.47	22	32	2	2.49	7.17	659.30	7.96	658.51

Table 2: 2024 Groundwater Elevations
CCR Unit Schahfer Waste Disposal Unit
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Monitoring Well Location	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft-NAVD88)	Measurement Date		Well Diameter (in)	Stickup (ft)	2024-03-13		2024-09-03	
				Screen Interval Top (ft-bgs)	Screen Interval Bottom (ft-bgs)			Depth to Water (ft-btoc)	Groundwater Elevation (ft-NAVD88)	Depth to Water (ft-btoc)	Groundwater Elevation (ft-NAVD88)
GAMW55B	2173632.34	2972222.72	667.53	25	35	2	2.35	8.00	659.53	8.98	658.55
GAMW55R	2173631.97	2972230.54	667.73	5	15	2	2.37	8.19	659.54	9.14	658.59
GAMW56	2173343.43	2972428.30	667.91	5	15	2	2.48	8.24	659.67	9.30	658.61
GAMW56B	2173343.23	2972423.77	667.82	25	35	2	2.49	8.16	659.66	9.22	658.60
GAMW57	2171592.09	2967729.66	672.99	5	15	2	2.52	14.22	658.77	15.60	657.39
GAMW57B	2171592.28	2967726.72	672.90	35	45	2	2.44	14.08	658.82	15.49	657.41
GAMW58	2171902.75	2967863.88	667.56	5	15	2	2.52	9.29	658.27	10.30	657.26
GAMW58B	2171900.81	2967867.00	667.61	25	35	2	2.73	9.32	658.29	10.35	657.26
GAMW59	2171317.51	2968668.03	668.51	5	15	2	2.58	9.71	658.80	10.73	657.78
GAMW59B	2171313.72	2968668.36	668.57	30	40	2	2.61	9.76	658.81	10.83	657.74
GAMW60	2171552.61	2968698.92	667.52	5	15	2	2.43	9.00	658.52	9.96	657.56
GAMW60B	2171549.04	2968699.96	667.52	30	40	2	2.46	8.75	658.77	9.72	657.80
GAMW63B	2171969.16	2971860.97	668.76	23	33	2	2.45	7.34	661.42	8.90	659.86
GAMW64B	2171789.81	2972174.66	666.85	21	31	2	2.43	5.52	661.33	7.05	659.80
GAMW65B	2173229.48	2968253.82	668.67	25	35	2	3.22	10.52	658.15	11.13	657.54
GAMW66B	2173363.62	2967853.20	672.99	34	44	2	3.79	15.24	657.75	15.88	657.11
GAMW67B	2174213.30	2967604.35	667.97	30.5	40.5	2	3.32	10.29	657.68	10.98	656.99
GAMW68	2970328.36	2168555.54	665.53	7	17	2	0.42	5.43	660.10	6.34	659.19
GAMW68B	2970325.08	2168557.42	665.72	24.5	34.5	2	0.25	5.61	660.11	6.54	659.18
GAMW72	2173514.76	2973920.43	666.93	5	15	2	2.82	8.22	658.71	8.62	658.31
GAMW72B	2173511.12	2973920.44	666.88	21	31	2	2.68	8.19	658.69	8.60	658.28
GAMW73	2173737.29	2974225.62	664.26	5	15	2	2.62	5.39	658.87	6.06	658.20
GAMW73B	2173740.94	2974228.37	664.31	18	18	2	2.65	5.45	658.86	6.10	658.21
GAMW74	2173737.57	2974539.26	664.44	5	15	2	2.82	5.51	658.93	6.21	658.23
GAMW74B	2173737.58	2974542.01	664.21	18	18	2	2.59	5.27	658.94	6.00	658.21
GAMW77	2171387.05	2967443.04	668.25	9.5	19.5	2	2.27	8.81	659.44	10.73	657.52
GAMW78	2171030.91	2967481.46	674.71	10	20	2	2.38	15.29	659.42	17.13	657.58
GAPIEZ07	2174443.92	2973071.62	668.77	5	15	2	3.62	10.68	658.09	11.04	657.73
MW-10D	2171037.13	2974845.36	663.18	NA	NA	2	0.98	3.44	659.74	4.38	658.80
MW-10S	2171039.40	2974843.76	662.53	NA	NA	2	0.58	2.85	659.68	3.75	658.78

Table 2: 2024 Groundwater Elevations
CCR Unit Schahfer Waste Disposal Unit
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Monitoring Well Location	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft-NAVD88)	Measurement Date		Well Diameter (in)	Stickup (ft)	2024-03-13		2024-09-03	
				Screen Interval Top (ft-bgs)	Screen Interval Bottom (ft-bgs)			Depth to Water (ft-btoc)	Groundwater Elevation (ft-NAVD88)	Depth to Water (ft-btoc)	Groundwater Elevation (ft-NAVD88)
MW-11D	2175123.58	2976338.85	663.57	NA	NA	2	2.06	4.79	658.78	6.05	657.52
MW-11S	2175119.58	2976338.76	663.25	NA	NA	2	1.79	4.49	658.76	5.72	657.53
MW-12D	2175120.55	2975384.31	663.60	NA	NA	2	2.02	4.75	658.85	5.90	657.70
MW-12S	2175120.73	2975379.24	663.48	NA	NA	2	1.94	4.65	658.83	5.83	657.65
MW-13D	2173960.00	2976837.35	664.80	NA	NA	2	2.77	5.90	658.90	7.08	657.72
MW-13S	2173953.77	2976836.91	664.67	NA	NA	2	2.45	5.77	658.90	6.94	657.73
MW-14D	2174539.41	2977869.89	665.41	NA	NA	2	2.77	6.06	659.35	8.05	657.36
MW-14S	2174539.25	2977863.57	665.24	NA	NA	2	2.67	5.91	659.33	7.86	657.38
MW-1D	2170444.49	2973803.64	668.86	NA	NA	2	2.50	7.23	661.63	9.11	659.75
MW-1S	2170448.20	2973803.98	668.81	NA	NA	2	2.38	7.21	661.60	9.08	659.73
MW-2D	2172923.26	2976537.67	663.73	NA	NA	2	1.56	4.55	659.18	5.62	658.11
MW-2S	2172927.38	2976537.39	664.10	NA	NA	2	2.00	4.95	659.15	6.00	658.10
MW-3D	2174870.27	2976027.63	667.58	NA	NA	2	2.74	9.02	658.56	9.97	657.61
MW-3S	2174870.86	2976031.85	667.58	NA	NA	2	2.76	9.05	658.53	9.91	657.67
MW-4D	2174850.77	2974079.15	666.56	NA	NA	2	2.43	8.44	658.12	8.84	657.72
MW-4S	2174855.51	2974079.60	666.90	NA	NA	2	2.64	8.79	658.11	9.17	657.73
MW-5D	2172943.46	2973945.66	664.37	NA	NA	2	1.62	6.10	658.27	6.34	658.03
MW-5S	2172947.30	2973945.82	664.29	NA	NA	2	1.57	6.00	658.29	6.28	658.01
MW-6D	2176184.07	2979231.73	664.64	NA	NA	2	2.85	7.51	657.13	9.64	655.00
MW-6S	2176187.92	2979232.21	664.61	NA	NA	2	2.60	7.52	657.09	9.64	654.97
MW-7D	2176191.44	2976686.21	664.72	NA	NA	2	2.71	5.99	658.73	7.72	657.00
MW-7S	2176190.47	2976682.35	664.80	NA	NA	2	2.81	5.70	659.10	7.78	657.02
MW-8D	2178623.03	2975045.81	663.52	NA	NA	2	2.18	6.26	657.26	8.11	655.41
MW-8S	2178621.44	2975049.79	663.75	NA	NA	2	2.33	6.48	657.27	8.35	655.40
MW-9D	2178811.96	2972838.00	662.68	NA	NA	2	0.84	5.30	657.38	6.85	655.83
MW-9S	2178809.97	2972839.80	662.42	NA	NA	2	0.59	5.08	657.34	6.60	655.82
SW-10	2170976.65	2975340.69	660.45	-	-	-	-	0.40	660.05	1.18	659.27
SW-4	2174898.62	2973926.86	662.48	-	-	-	-	0.75	661.73	0.75	661.73
Davis Ditch West Gate	2173623.30	2967604.35	668.17	-	-	-	-	10.96	657.21	11.54	656.63

Notes:
Locations surveyed in US State Plane Indiana West Zone North American Datum of 1983 and North American Vertical Datum of 1988 (ft)
CCR = coal combustion residual
ft-bgs = feet below ground surface
ft-btoc = feet below top of casing
ft-NAVD88 = feet relative to NAVD88
in = inch
NA = not available

Prepared by: MJS
Checked by: DFSC
Reviewed by: JBG

Table 3: Summary of Sampling Events
CCR Unit Schahfer Waste Disposal Area
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Well Purpose	Monitoring Well ID	Sample Event #22	Sample Event #23	Total Number of Samples
Purpose of Sample		Annual Assessment Monitoring	Semi-Annual Assessment Monitoring	
Sample Parameters		Appendix III and Appendix IV	Appendix III and detected Appendix IV	
Background Monitoring Well	GAMW03	4/3/2024	9/12/2024	2
	GAMW03B	4/3/2024	9/12/2024	2
	GAMW68	4/12/2024	9/12/2024	2
	GAMW68B	4/12/2024	9/12/2024	2
Downgradient Monitoring Well	GAMW01	4/2/2024	9/11/2024	2
	GAMW01B	4/2/2024	9/11/2024	2
	GAMW12	4/2/2024	9/17/2024	2
	GAMW12B	4/3/2024	9/24/2024	2
	GAMW13	4/1/2024	9/17/2024	2
	GAMW13B	4/2/2024	9/17/2024	2
	GAMW14	4/1/2024	9/16/2024	2
	GAMW14B	4/1/2024	9/16/2024	2
	GAMW42	4/16/2024	9/25/2024	2
	GAMW42B	4/16/2024	9/25/2024	2
	GAMW42C	4/16/2024	9/26/2024	2
	GAMW43	4/17/2024	9/26/2024	2
	GAMW43B	4/17/2024	9/27/2024	2
	GAMW44	4/16/2024	9/25/2024	2
	GAMW44B	4/16/2024	9/25/2024	2
	GAMW51	4/4/2024	9/13/2024	2
	GAMW51B	4/4/2024	9/13/2024	2
	GAMW57	4/17/2024	9/26/2024	2
	GAMW57B	4/17/2024	9/26/2024	2
	GAMW58	4/19/2024	9/26/2024	2
	GAMW58B	4/19/2024	9/26/2024	2
	GAMW59	4/3/2024	9/13/2024	2
	GAMW59B	4/11/2024	9/13/2024	2
	GAMW60	4/3/2024	9/16/2024	2
	GAMW60B	4/3/2024	9/16/2024	2
	GAMW77	4/16/2024	9/27/2024	2
Total Number of Samples		30	30	60

Notes:

Sample counts do not include QC/QA samples.

(1) Sample events #1-19 were completed prior to 2023. The purpose, sample parameters, and sample dates are included in the 2017, 2018, 2019, 2020, 2021, 2022, and 2023 Annual Reports.

(2) Sample events #20 and 21 correspond to the Assessment/Detection Monitoring events, respectively.

Prepared by: AJS 1/7/2025
Checked by: DBSC 1/8/2025
Reviewed by: JRG 1/10/25

Table 4: 2024 Analytical Data
CCR Unit Schahfer Waste Disposal Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW01		GAMW01B			GAMW03		GAMW03B		GAMW12			GAMW12B	
	Sample Date	2024-04-02	2024-09-11	2024-04-02		2024-09-11	2024-04-03	2024-09-12	2024-04-03	2024-09-12	2024-04-02	2024-09-17		2024-04-03	2024-09-24
	Sample Type	N	N	FD	N	N	N	N	N	N	N	FD	N	N	N
Chemical	Unit														
CCR Appendix III															
Boron	mg/L	0.86	1.6	0.34	0.34	0.37	0.22	0.17	0.39	0.43	0.053 J	0.069 J	0.072 J	0.36	0.43
Calcium	mg/L	88.1	97.6	110	111	112	85.8	82.1	104	110	75.5	79	83.6	111	103
Chloride	mg/L	4.5	8.7	22.6	22.6	24.5	14.1	4.4	24.6	23.2	4.5	3.2	3.2	23.7	23.6
Fluoride	mg/L	0.3	0.39	0.15	0.15	0.16	0.23	0.13	0.21	0.21	0.22	0.25	0.25	0.11	0.099 J
pH	SU	7.36	6.99		7.18	6.96	7.22	6.81	7.31	7.12	7.03		7.00	7.26	7.62
Sulfate	mg/L	108	123	77.7	75.7	84.7	76.7	48.5	115	129	28.7	9.1	9	107	124 J-
Total Dissolved Solids	mg/L	341	422	451	429	426	319	332	449	475	271	300	302	469	485
CCR Appendix IV															
Antimony	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00042 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Arsenic	mg/L	0.0033	0.0075	0.00026 J	0.00032 J	0.00032 J	0.004	0.013	0.00042 J	0.00046 J	0.0051	0.014	0.014	0.00034 J	0.00042 J
Barium	mg/L	0.045	0.062	0.17	0.17	0.18	0.087	0.093	0.11	0.11	0.072	0.087	0.086	0.15	0.15
Beryllium	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Cadmium	mg/L	2E-05 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	5.7E-05 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Chromium	mg/L	0.002 U	0.00047 J	0.002 U	0.002 U	0.00051 J	0.00032 J	0.00043 J	0.0004 J	0.00048 J	0.002 U	0.002 U	0.002 U	0.00037 J	0.002 U
Cobalt	mg/L	0.0012	0.0018	0.00026 J	0.00026 J	0.00026 J	0.0053	0.00091 J	0.00051 J	0.00022 J	0.00056 J	0.0012	0.0012	0.00022 J	0.00019 J
Fluoride	mg/L	0.3	0.39	0.15	0.15	0.16	0.23	0.13	0.21	0.21	0.22	0.25	0.25	0.11	0.099 J
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00013 J	0.001 U	8.8E-05 J	0.001 U	7.3E-05 J	0.001 U	0.001 U	0.001 U	6.5E-05 J
Lithium	mg/L	0.02 U	0.005 J	0.0059 J	0.0095 J	0.0062 J	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.0064 J	0.0041 J	0.02 U	0.0052 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.015	0.017	0.001	0.001	0.00088 J	0.01	0.011	0.006	0.0056	0.011	0.0052	0.0052	0.0016	0.0025
Radium, Total	pCi/L	1.58 U	1.86 U	2.21 U	1.74	2.15 U	1.25 U	2.34 U	1.76	1.8 U	1.86 U	2.19 U	2.38 U	1.6 U	1.69 U
Selenium	mg/L	0.0095	0.0031	0.001 U	0.001 U	0.001 U	0.00039 J	0.001 U	0.001 U	0.001 U	0.00042 J	0.00027 J	0.00028 J	0.001 U	0.001 U
Thallium	mg/L	0.001 U	0.00014 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Sample Parameters															
Dissolved Oxygen	mg/L	0.08	0.08		-0.42	-0.13	2.01	0.05	-0.35	-0.13	0.84		-0.10	0.20	-0.03
Oxidation-Reduction Potential	millivolts	3.6	-52.7		-85.1	-107.1	98.3	-97.1	-65.8	-121.7	-63.9		-130.1	-103.6	-119.7
pH	SU	7.36	6.99		7.18	6.96	7.22	6.81	7.31	7.12	7.03		7.00	7.26	7.62
Specific Conductance	mS/cm	0.473	0.617		0.606	0.628	0.383	0.488	0.552	0.597	0.502		0.488	0.559	0.624
Temperature	deg c	9.6	18.6		12.3	15.2	8.8	17.6	10.7	14.5	9.4		18.2	11.5	15.1
Turbidity	ntu	4.59	1.85		4.02	1.16	7.10	3.29	3.73	3.94	4.84		3.95	5.30	3.60

Notes:
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated
"J-" = Indicates the result was estimated, bias low
"J+" = Indicates the result was estimated, bias high
"UJ" = Indicates the result is estimated and non-detect.

Abbreviations:
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mS/cm = milli Siemens per centimeter
pCi/L = picocuries per liter
SU = Standard Units
N = normal sample
FD = field duplicate

Table 4: 2024 Analytical Data
CCR Unit Schahfer Waste Disposal Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW13		GAMW13B		GAMW14		GAMW14B		GAMW42		GAMW42B		GAMW42C	
	Sample Date	2024-04-01	2024-09-17	2024-04-02	2024-09-17	2024-04-01	2024-09-16	2024-04-01	2024-09-16	2024-04-16	2024-09-25	2024-04-16	2024-09-25	2024-04-16	2024-09-26
	Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Chemical	Unit														
CCR Appendix III															
Boron	mg/L	0.15	0.32	0.61	0.69	0.091 J	0.1 U	3.7	4.8	0.025 J	0.041 J	0.032 J	0.037 J	0.56	0.59
Calcium	mg/L	76.1	71.4	78.5	77.6	58.2	49.8	155	149	56.8	57.1	63.5	57.8	56.1	52.1
Chloride	mg/L	12.7	15.1	26.8	27.3	1.1	0.99	125	153	10.9	9.3	12.3	8.5	11.1	8.2
Fluoride	mg/L	0.21	0.28	0.29	0.24	0.21	0.2	0.32	0.28	0.13	0.13	0.13	0.13	0.2	0.18
pH	SU	6.79	6.84	7.60	7.56	6.96	6.82	7.78	7.62	7.67	7.82	7.75	8.02	7.54	7.66
Sulfate	mg/L	30.7	45.7	115	133	34.4	32.7	1240	1520	64.7	42	44.2	34.4	4.9	4
Total Dissolved Solids	mg/L	303	312	373	373	220	203	2220	2550	217	221	243	217	213	212
CCR Appendix IV															
Antimony	mg/L	0.00032 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Arsenic	mg/L	0.0043	0.0059	0.0014	0.0013	0.011	0.013	0.0008 J	0.00093 J	0.0021	0.0013	0.00027 J	0.00028 J	0.00041 J	0.0011
Barium	mg/L	0.081	0.12	0.081	0.079	0.037	0.025	0.083	0.1	0.022	0.021	0.022	0.02	0.0092	0.0083
Beryllium	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	7.5E-05 J	7.9E-05 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	2.8E-05 J	3.6E-05 J
Cadmium	mg/L	0.00014 J	7.7E-05 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Chromium	mg/L	0.00089 J	0.002 U	0.002 U	0.002 U	0.00082 J	0.0011 J	0.0019 J	0.0024	0.002 U	0.00092 J	0.002 U	0.0007 J	0.002 U	0.0028
Cobalt	mg/L	0.00082 J	0.00063 J	0.001 U	0.00011 J	0.0079	0.0065	0.00036 J	0.00039 J	0.00014 J	0.0001 J	0.00018 J	0.00011 J	0.00046 J	0.0013
Fluoride	mg/L	0.21	0.28	0.29	0.24	0.21	0.2	0.32	0.28	0.13	0.13	0.13	0.13	0.2	0.18
Lead	mg/L	0.001 U	0.001 U	4.6E-05 J	0.001 U	0.001 U	7.1E-05 J	7.5E-05 J	9.5E-05 J	0.001 U	9.2E-05 J	0.001 U	0.0001 J	0.001 U	0.0018
Lithium	mg/L	0.02 U	0.02 U	0.02 U	0.0053 J	0.02 U	0.02 U	0.011 J	0.004 J	0.02 U	0.02 U	0.02 U	0.02 U	0.029	0.03
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.0039	0.0082	0.015	0.016	0.0042	0.0073	0.027	0.029	0.0037	0.0028	0.0028	0.0024	0.0026	0.0036
Radium, Total	pCi/L	1.54 U	1.59 U	1.65 U	2.61 U	1.26 U	1.8 U	1.61 U	2.55	2.11 U	1.84 UJ	1.56 U	1.69 UJ	2.02	1.41 UJ
Selenium	mg/L	0.00076 J	0.00057 J	0.001 U	0.001 U	0.001 U	0.00043 J	0.00047 J	0.00054 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00044 J
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	4.3E-05 J	0.00014 J
Sample Parameters															
Dissolved Oxygen	mg/L	0.41	0.07	0.25	-0.05	-0.40	0.07	-0.33	-0.06	-0.39	0.11	-0.24	-0.05	-0.33	-0.04
Oxidation-Reduction Potential	millivolts	-76.8	-116.6	-128.0	-158.3	-89.6	-92.7	-106.7	-129.1	-107.2	-136.5	-119.7	-163.7	-120.4	-146.2
pH	SU	6.79	6.84	7.60	7.56	6.96	6.82	7.78	7.62	7.67	7.82	7.75	8.02	7.54	7.66
Specific Conductance	mS/cm	0.408	0.527	0.461	0.512	0.227	0.302	2.476	2.817	0.305	0.317	0.336	0.298	0.373	0.351
Temperature	deg c	9.6	18.6	11.9	16.2	9.8	17.4	12.3	14.8	11.7	15.3	12.6	13.3	12.5	12.8
Turbidity	ntu	4.55	0.72	4.12	0.49	0.96	4.21	3.18	1.65	4.31	3.97	4.28	9.74	11.60	99.79

Notes:
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"J" = Indicates the result was estimated
"J-" = Indicates the result was estimated, bias low
"J+" = Indicates the result was estimated, bias high
"UJ" = Indicates the result is estimated and non-detect.

Abbreviations:
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mS/cm = milli Siemens per centimeter
pCi/L = picocuries per liter
SU = Standard Units
N = normal sample
FD = field duplicate

Table 4: 2024 Analytical Data
CCR Unit Schahfer Waste Disposal Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW43		GAMW43B		GAMW44		GAMW44B			GAMW51		GAMW51B			GAMW57	
	Sample Date	2024-04-17	2024-09-26	2024-04-17	2024-09-27	2024-04-16	2024-09-25	2024-04-16	2024-09-25		2024-04-04	2024-09-13	2024-04-04	2024-09-13		2024-04-17	2024-09-26
	Sample Type	N	N	N	N	N	N	N	FD	N	N	N	N	FD	N	N	N
Chemical	Unit																
CCR Appendix III																	
Boron	mg/L	0.012 J	0.006 J	0.028 J	0.025 J	0.022 J	0.036 J	0.022 J	0.026 J	0.027 J	0.29	0.82	7.7	8.4	8	0.028 J	0.023 J
Calcium	mg/L	21.9	30.3	37.7	36	15.4	21.7	31.7	38.8	39.7	129	175	208	211	196	19.2	23.7
Chloride	mg/L	0.61	0.57	1.6	1.2	2.4	1.5	1.5	22.2	21.9	0.93	5.2	46.4	47.9	47.7	2.2	0.92
Fluoride	mg/L	0.12	0.14	0.18	0.17	0.23	0.075 J	0.11	0.1	0.1	0.14	0.46	1.1	1.2	1.1	0.05 U	0.05 U
pH	SU	7.33	7.38	7.96	8.24	6.18	6.28	7.93		7.93	6.99	6.88	7.99		7.80	6.30	8.07
Sulfate	mg/L	21.8	20	21	18.3	46.2	51.4	12.4	7.8	7.9	99.3	312	1210	1200	1190	48	28.8
Total Dissolved Solids	mg/L	84	94	116	145	140	107	104	146	149	468	752	1910	1890	1780	96	70
CCR Appendix IV																	
Antimony	mg/L	0.00021 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Arsenic	mg/L	0.0023	0.0033	0.00044 J	0.00045 J	0.03	0.021	0.0002 J	0.00026 J	0.00026 J	0.0017	0.00065 J	0.0044	0.0042	0.0044	0.00028 J	0.00069 J
Barium	mg/L	0.014	0.018	0.011	0.011	0.029	0.019	0.0083	0.011	0.011	0.096	0.1	0.052	0.055	0.055	0.012	0.0038
Beryllium	mg/L	3.4E-05 J	0.0002 U	2.6E-05 J	2.7E-05 J	0.00029	9.6E-05 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	2.8E-05 J	0.0002 U
Cadmium	mg/L	2.1E-05 J	2.5E-05 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	1.7E-05 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	4.5E-05 J	0.0002 U
Chromium	mg/L	0.0013 J	0.002 U	0.00064 J	0.00065 J	0.0064	0.0019 J	0.002 U	0.00061 J	0.00055 J	0.00039 J	0.002 U	0.00052 J	0.002 U	0.002 U	0.0009 J	0.002 U
Cobalt	mg/L	0.0011	0.00091 J	9.5E-05 J	8.3E-05 J	0.0012	0.00098 J	7.8E-05 J	6.6E-05 J	6.3E-05 J	0.0017	0.0022	0.00031 J	0.00032 J	0.00033 J	0.0018	0.00014 J
Fluoride	mg/L	0.12	0.14	0.18	0.17	0.23	0.075 J	0.11	0.1	0.1	0.14	0.46	1.1	1.2	1.1	0.05 U	0.05 U
Lead	mg/L	0.00053 J	8.2E-05 J	0.001 U	0.00014 J	0.0017	0.00013 J	0.001 U	0.00026 J	0.00027 J	0.00012 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00047 J
Lithium	mg/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.056	0.051	0.055	0.02 U	0.02 U
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.0018	0.0033	0.0022	0.0023	0.0021	0.0026	0.002	0.0015	0.0015	0.0018	0.016	0.14	0.12	0.13	0.002	0.001
Radium, Total	pCi/L	1.57 U	1.81 UJ	1.24 U	1.71 U	1.9 U	1.6 UJ	1.23 U	1.74 J-	1.49 UJ	2.25 U	1.77 U	2.68 J+	3.32	4.1	1.57 U	1.63 UJ
Selenium	mg/L	0.00039 J	0.00033 J	0.001 U	0.001 U	0.0012	0.001 U	0.001 U	0.001 U	0.001 U	0.0004 J	0.001 U	0.00037 J	0.00036 J	0.00033 J	0.00026 J	0.00041 J
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Sample Parameters																	
Dissolved Oxygen	mg/L	-0.17	0.18	-0.34	0.04	0.51	0.94	0.27		-0.11	-0.18	-0.05	-0.39		-0.12	4.75	4.21
Oxidation-Reduction Potential	millivolts	105.5	18.5	-95.6	-183.5	-51.0	-14.1	-135.3		-167.4	56.7	-107.9	-138.6		-167.8	167.3	75.2
pH	SU	7.33	7.38	7.96	8.24	6.18	6.28	7.93		7.93	6.99	6.88	7.99		7.80	6.30	8.07
Specific Conductance	mS/cm	0.127	0.204	0.184	0.184	0.142	0.179	0.148		0.185	0.519	0.941	2.028		2.021	0.131	0.135
Temperature	deg c	9.9	17.1	11.0	12.9	10.3	15.6	11.9		12.6	10.1	17.2	12.0		14.6	10.2	13.0
Turbidity	ntu	5.11	3.39	0.82	3.09	18.80	2.51	2.00		0.19	41.80	1.01	1.24		0.88	4.14	3.99

Notes:
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
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"J-" = Indicates the result was estimated, bias low
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Abbreviations:
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NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mS/cm = milli Siemens per centimeter
pCi/L = picocuries per liter
SU = Standard Units
N = normal sample
FD = field duplicate

Table 4: 2024 Analytical Data
CCR Unit Schahfer Waste Disposal Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW57B			GAMW58		GAMW58B		GAMW59		GAMW59B		GAMW60		GAMW60B	
	Sample Date	2024-04-17		2024-09-26	2024-04-19	2024-09-26	2024-04-19	2024-09-26	2024-04-03	2024-09-13	2024-04-11	2024-09-13	2024-04-03	2024-09-16	2024-04-03	2024-09-16
	Sample Type	FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Chemical	Unit															
CCR Appendix III																
Boron	mg/L	0.061 J	0.061 J	0.15	0.035 J	0.031 J	0.037 J	0.036 J	4.5	1.4	4.9	4.2	2.8	1.5	3.7	4.2
Calcium	mg/L	46	46.2	52.6	9.2	10.8	37.5	37.9	247	194	124	188	262	337	363	300
Chloride	mg/L	14.3	14.4	15	0.78	0.84	3.7	4.1	105	23.4	59	35.6	39.5	21.5	13.2	21.3
Fluoride	mg/L	0.13	0.13	0.12	0.44	0.6	0.13	0.15	0.8	0.91	0.46	0.55	0.59	0.44	0.54	0.51
pH	SU		7.67	7.57	5.59	5.91	7.80	7.81	7.30	7.14	7.71	7.50	6.99	6.80	7.47	7.49
Sulfate	mg/L	15.6	15.7	19.3	46.3	46.2	23.7	20.7	380	219	843	800	492	673	1050	873
Total Dissolved Solids	mg/L	167	163	182	50	57	122	132	884	686	1570	1480	1040	1320	1590	1420
CCR Appendix IV																
Antimony	mg/L	0.001 U	0.001 U	0.001 U	8.9E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00024 J	0.001 U	0.001 U
Arsenic	mg/L	0.00057 J	0.00054 J	0.00064 J	0.0038	0.0044	0.0007 J	0.00074 J	0.00094 J	0.00099 J	0.0011	0.0008 J	0.00028 J	0.00035 J	0.00024 J	0.00015 J
Barium	mg/L	0.021	0.021	0.024	0.051	0.045	0.015	0.014	0.063	0.049	0.028 J+	0.029	0.036	0.046	0.057	0.053
Beryllium	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0011	0.00086	0.0002 U	0.0002 U	0.0002 U	0.0002 U	2.8E-05 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Cadmium	mg/L	0.0002 U	0.0002 U	0.0002 U	0.00034	0.0002	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	3.5E-05 J	3.8E-05 J	1.7E-05 J	0.0002 U
Chromium	mg/L	0.00082 J	0.00039 J	0.002 U	0.0014 J	0.002 U	0.00047 J	0.002 U	0.00032 J	0.002 U	0.00088 J	0.002 U	0.00072 J	0.00032 J	0.0005 J	0.00051 J
Cobalt	mg/L	8.7E-05 J	8.2E-05 J	9.1E-05 J	0.015	0.014	9.1E-05 J	9.5E-05 J	0.00084 J	0.00074 J	0.0003 J	0.0003 J	0.00082 J	0.00096 J	0.0004 J	0.00035 J
Fluoride	mg/L	0.13	0.13	0.12	0.44	0.6	0.13	0.15	0.8	0.91	0.46	0.55	0.59	0.44	0.54	0.51
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.00067 J	0.00058 J	6.5E-05 J	5.2E-05 J	0.001 U	0.001 U	3.8E-05 J	0.001 U	9.7E-05 J	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.0092 J	0.0054 J	0.011 J	0.0047 J	0.012 J	0.0059 J	0.064	0.066
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.0024	0.0024	0.006	0.0011	0.00084 J	0.0025	0.0041	0.02	0.015	0.072	0.055	0.027	0.011	0.15	0.17
Radium, Total	pCi/L	1.81 U	1.54 U	1.28 UJ	1.32 U	2.22 UJ	1.37 U	1.62 UJ	1.27	1.88	1.85 U	3.05	1.71 U	2.25 U	3.58	1.97 U
Selenium	mg/L	0.001 U	0.001 U	0.001 U	0.0023	0.0034	0.001 U	0.001 U	0.001 U	0.001 U	0.00034 J	0.001 U	0.0012	0.0035	0.001 U	0.001 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Sample Parameters																
Dissolved Oxygen	mg/L		0.25	-0.11	1.01	0.16	0.36	-0.15	-0.41	-0.04	0.19	-0.10	0.31	0.05	0.23	-0.11
Oxidation-Reduction Potential	millivolts		-122.3	-138.1	168.9	47.8	-98.9	-147.8	-57.1	-119.4	-128.2	-150.9	82.4	27.4	-102.0	-138.1
pH	SU		7.67	7.57	5.59	5.91	7.80	7.81	7.30	7.14	7.71	7.50	6.99	6.80	7.47	7.49
Specific Conductance	mS/cm		0.239	0.283	0.085	0.098	0.188	0.201	1.041	0.892	1.833	1.661	1.016	1.501	1.47	1.481
Temperature	deg c		11.3	12.4	9.3	14.6	10.6	12.7	12.4	19.6	13.5	16.3	12.6	19.7	12.6	15.6
Turbidity	ntu		2.35	0.01	2.05	2.87	2.97	0.73	3.88	3.75	0.88	0.85	1.90	1.08	2.86	1.29

Notes:
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Abbreviations:
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NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mS/cm = milli Siemens per centimeter
pCi/L = picocuries per liter
SU = Standard Units
N = normal sample
FD = field duplicate

Table 4: 2024 Analytical Data
CCR Unit Schahfer Waste Disposal Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW68			GAMW68B		GAMW77	
	Sample Date	2024-04-12	2024-09-12		2024-04-12	2024-09-12	2024-04-16	2024-09-27
	Sample Type	N	FD	N	N	N	N	N
Chemical	Unit							
CCR Appendix III								
Boron	mg/L	0.021 J	0.1 U	0.1 U	0.029 J	0.1 U	0.017 J	0.019 J
Calcium	mg/L	61.9	62.8	62.4	38.6	35.2	17.7	17.9
Chloride	mg/L	24.6	24.2	23.9	12.2	12.9	1.4	1.8
Fluoride	mg/L	0.2	0.19	0.19	0.13	0.13	0.13	0.066 J
pH	SU	7.75		7.54	8.05	7.93	6.81	7.53
Sulfate	mg/L	65.5	70.9	64.6	44.8	44.1	24.6	14.1
Total Dissolved Solids	mg/L	293	292	280	225	169	67	86
CCR Appendix IV								
Antimony	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Arsenic	mg/L	0.0012	0.0011	0.0011	0.00038 J	0.00025 J	0.00024 J	0.0005 J
Barium	mg/L	0.096	0.099	0.099	0.1	0.076	0.036	0.019
Beryllium	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0008	0.00054
Cadmium	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.00013 J	6.7E-05 J
Chromium	mg/L	0.002 U	0.00063 J	0.00024 J	0.002 U	0.00037 J	0.002 U	0.00071 J
Cobalt	mg/L	0.0004 J	0.00034 J	0.00036 J	8E-05 J	8.1E-05 J	0.0017	0.00066 J
Fluoride	mg/L	0.2	0.19	0.19	0.13	0.13	0.13	0.066 J
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.00019 J	0.00017 J	0.001 U	0.0002 J
Lithium	mg/L	0.02 U	0.02 U	0.0044 J	0.0057 J	0.02 U	0.02 U	0.02 U
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.0032	0.0035	0.0036	0.002	0.0017	0.00047 J	0.0007 J
Radium, Total	pCi/L	1.78 U	1.74 U	2.08 U	1.81 U	1.71 U	1.66 U	1.7 U
Selenium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0019	0.0015
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Sample Parameters								
Dissolved Oxygen	mg/L	-0.39		0.07	-0.40	-0.05	3.55	2.88
Oxidation-Reduction Potential	millivolts	-117.9		-106.8	-148.1	-162.1	122.3	45.7
pH	SU	7.75		7.54	8.05	7.93	6.81	7.53
Specific Conductance	mS/cm	0.364		0.407	0.259	0.249	0.107	0.123
Temperature	deg c	9.9		15.8	11.5	14.2	11.4	13.7
Turbidity	ntu	3.89		4.08	4.08	2.33	4.21	3.82

Notes:
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"UJ" = Indicates the result is estimated and non-detect.

Prepared by: MJS 11/20/24
Checked by: DFSC
Reviewed by: JBG

Abbreviations:
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mS/cm = milli Siemens per centimeter
pCi/L = picocuries per liter
SU = Standard Units
N = normal sample
FD = field duplicate

Table 6: Groundwater Protection Standards
CCR Unit Schahfer Waste Disposal Area
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL (mg/L)	GWPS (mg/L)[2]	GWPS (mg/L)[3]	GWPS (mg/L)[4]
Antimony	0.006	0.006	0.006	0.006
Arsenic	0.01	0.015	0.018	0.019
Barium	2	2	2	2
Beryllium	0.004	0.004	0.004	0.004
Cadmium	0.005	0.005	0.005	0.005
Chromium	0.1	0.1	0.1	0.1
Cobalt[1]	0.006	0.015	0.015	0.015
Fluoride	4	4	4	4
Lead[1]	0.015	0.015	0.015	0.015
Lithium[1]	0.04	0.04	0.04	0.04
Mercury	0.002	0.002	0.002	0.002
Molybdenum[1]	0.1	0.1	0.1	0.1
Radium 226+228	5	5	5	5
Selenium	0.05	0.05	0.05	0.05
Thallium	0.002	0.002	0.002	0.002

Notes:
MCL= Environmental Protection Agency Maximum Contaminant Level
GWPS= Groundwater Protection Standard
mg/L= milligrams per liter
1) As of August 29, 2018, these four constituents have health-based standards that can be used when calculating the GWPS. These health-based standards are not MCLs but are provided in the MCL column.
2) GWPS calculated in August 2018.
3) GWPS calculated in March 2020.
4) GWPS calculated in September 2022.

Prepared by: GRD
Checked by: DFSC
Reviewed by: MAH

Figures



LEGEND

Approximate Property Line

0 0.75 1.5

1 " = 0.75 miles Miles

REFERENCE(S)

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

SITE LOCATION MAP

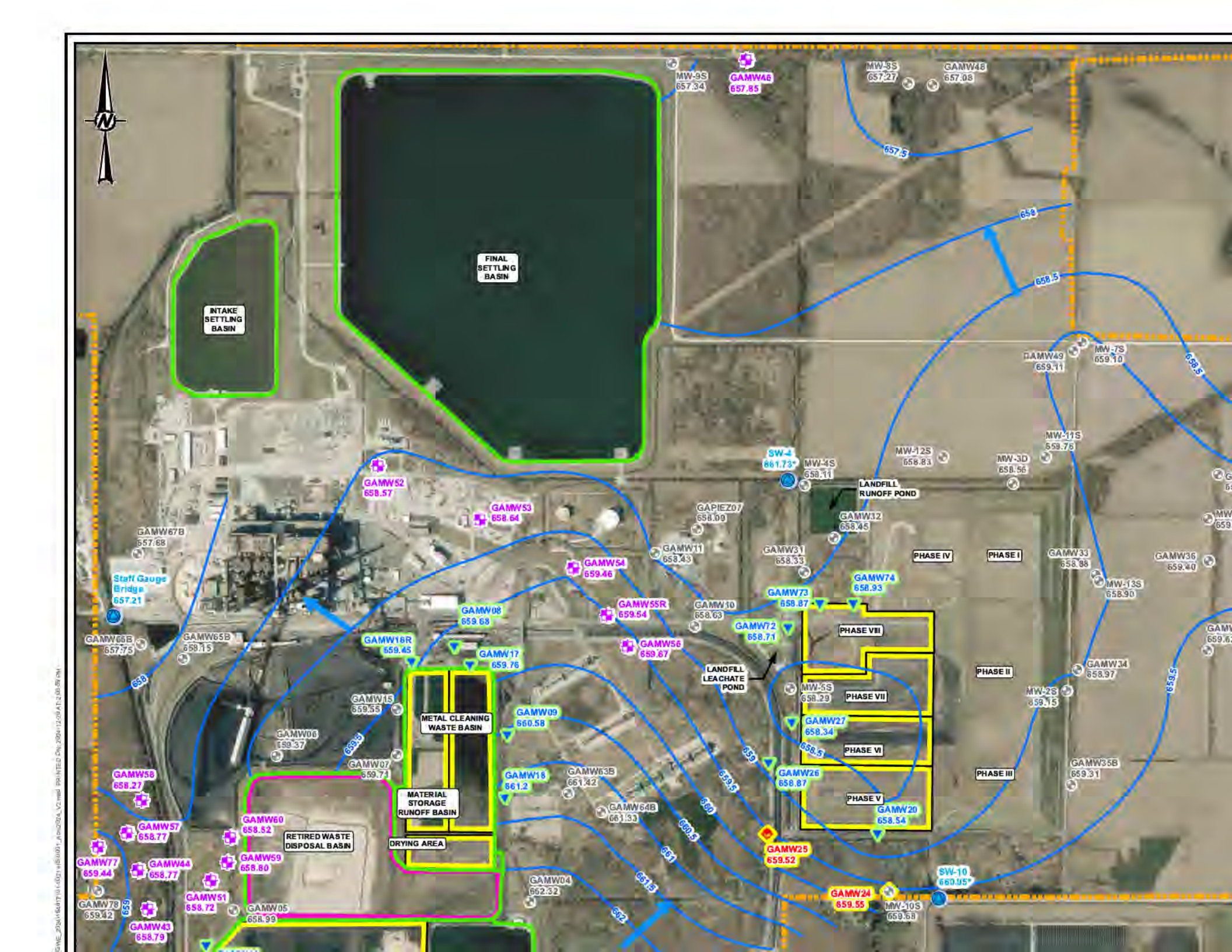
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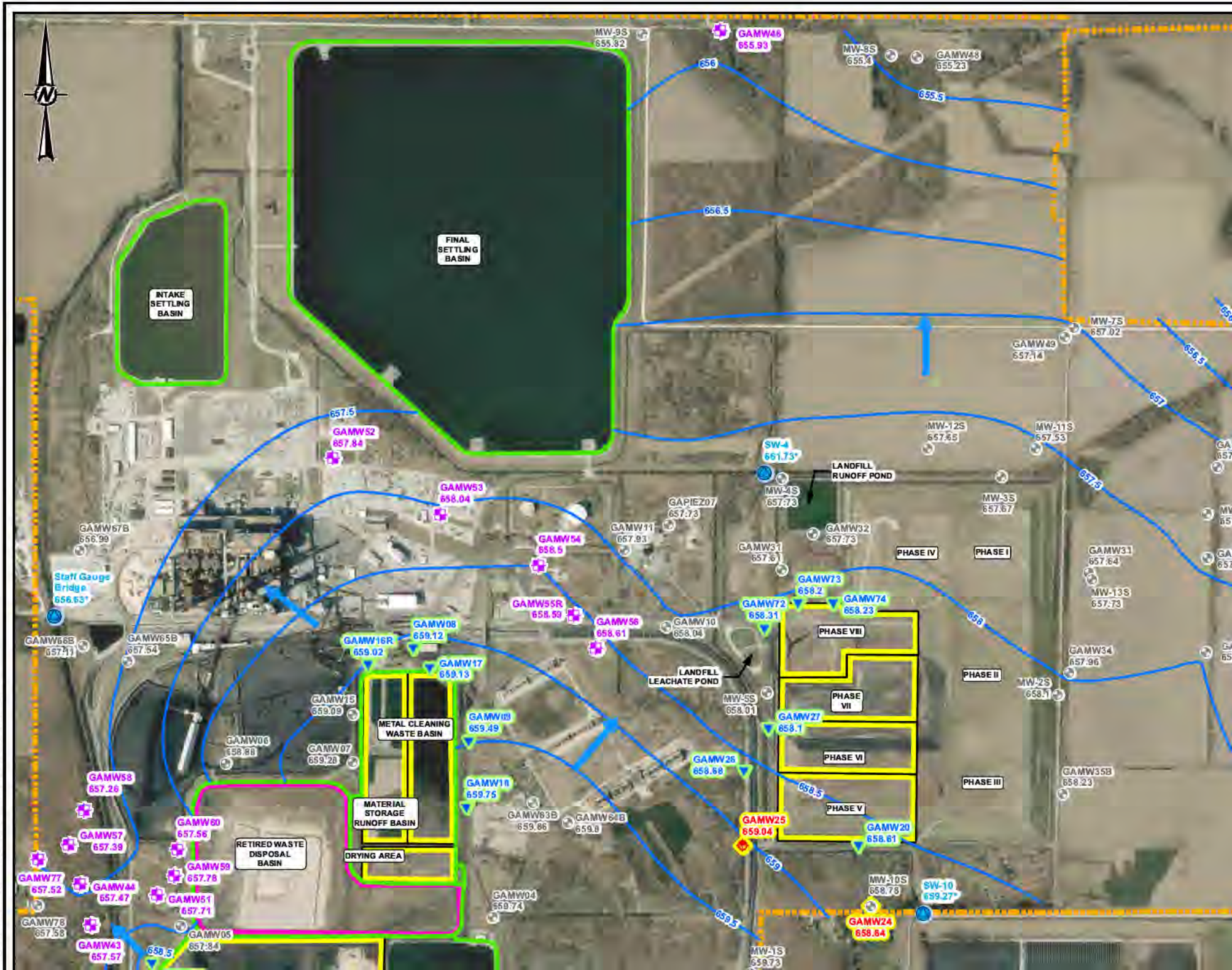
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(YYYY-MM-DD)	1/04/2021
DESIGNED	DFSC
PREPARED	SHL
REVIEWED	DFSC
APPROVED	MAH

PROJECT NO.	CONTROL	REV	FIGURE
31406779	A	0	1


2970000
GAMW58/58B
GAMW57/57B
GAMW60/60B
GAMW77
GAMW59/59B
GAMW44/44B
GAMW51/51B
GAMW43/43B
GAMW14/14B
GAMW42C
GAMW42/42B
GAMW13/13B
WASTE
DISPOSAL AREA
GAMW12/12B
GAMW01/01B


FINAL SETTLING BASIN
INTAKE SETTLING BASIN
METAL CLEANING WASTE BASIN
MATERIAL STORAGE RUNOFF BASIN
DRYING AREA
RETIRED WASTE DISPOSAL BASIN
LANDFILL RUNOFF POND
LANDFILL LEACHATE POND
PHASE I
PHASE II
PHASE III
PHASE IV
PHASE V
PHASE VI
PHASE VII
PHASE VIII
MW-9S 657.34
GAMW46 657.85
MW-8S 657.27
GAMW48 657.08
GAMW49 659.11
MW-7S 659.10
MW-11S 659.75
MW-12S 658.83
MW-3D 658.56
SW-4 661.73*
MW-4S 658.11
GAMW52 658.57
GAMW53 658.64
GAPIEZ07 658.09
GAMW32 658.45
GAMW67B 657.68
GAMW11 658.43
GAMW31 658.33
GAMW33 658.88
GAMW36 659.40
MW-13S 658.90
Staff Gauge Bridge 657.21
GAMW54 659.46
GAMW74 658.93
GAMW73 658.87
GAMW55R 659.54
GAMW10 658.63
GAMW72 658.71
GAMW08 659.68
GAMW66B 657.75
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GAMW16R 659.45
GAMW17 659.76
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GAMW09 660.58
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GAMW06 659.37
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GAMW63B 661.42
GAMW26 658.87
GAMW57 658.77
GAMW60 658.52
GAMW64B 661.33
GAMW20 658.54
GAMW77 659.44
GAMW44 658.77
GAMW59 658.80
GAMW25 659.52
GAMW51 658.72
GAMW04 662.32
SW-10 660.95*
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GAMW78 659.42
GAMW05 658.99
MW-10S 659.68
GAMW43 658.79
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FINAL SETTLING BASIN
INTAKE SETTLING BASIN
METAL CLEANING WASTE BASIN
MATERIAL STORAGE RUNOFF BASIN
DRYING AREA
RETIRED WASTE DISPOSAL BASIN
LANDFILL RUNOFF POND
LANDFILL LEACHATE POND
PHASE I
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PHASE III
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PHASE V
PHASE VI
PHASE VII
PHASE VIII
MW-9S 655.82
GAMW46 655.93
MW-8S 655.4
GAMW43 655.23
MW-7S 657.02
GAMW49 657.14
MW-12S 657.35
MW-11S 657.53
MW-3S 657.67
GAMW32 657.73
GAMW31 657.64
MW-13S 657.73
GAMW34 657.96
MW-2S 658.1
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GAMW54 658.5
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GAMW24 658.64
MW-10S 658.78
MW-1S 659.73
SW-4 661.73*
SW-10 659.27*
Staff Gauge Bridge 656.63*
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BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 148
Culley 2024 Groundwater Monitoring Report

HALEY ALDRICH

www.haleyaldrich.com

ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
EAST ASH POND
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

by
Haley & Aldrich, Inc.
Greenville, South Carolina

for
Southern Indiana Gas and Electric Company
Evansville, Indiana

File No. 129420
January 2025

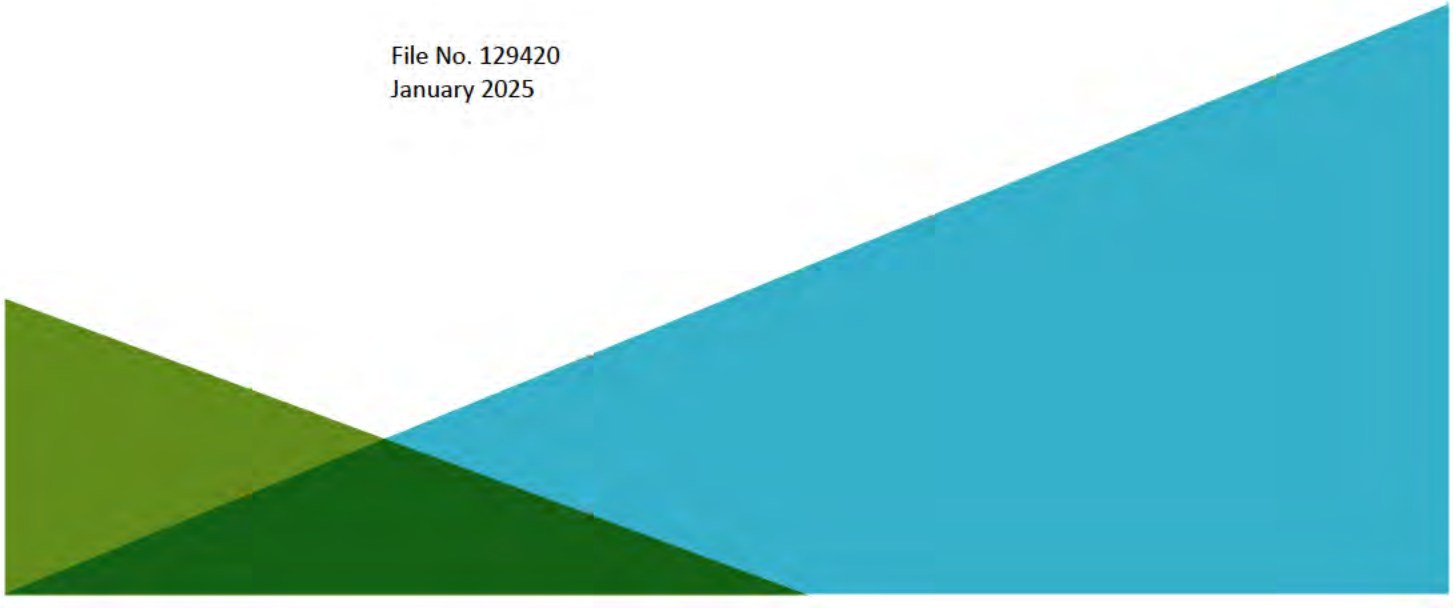


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1. Annual Groundwater Monitoring Report Summary

1.1 CODE OF FEDERAL REGULATIONS TITLE 40 (40 CFR) § 257.90(e)(6) SUMMARY

A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the [coal combustion residual] CCR unit. At a minimum, the summary must specify all of the following.

1.1.1 40 CFR § 257.90(e)(6)(i) – Status of Monitoring Program at Start of Reporting Period

At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in § 257.95.

At the start of the current annual reporting period (1 January 2024), the East Ash Pond (EAP) at F.B. Culley Generating Station was operating under an assessment monitoring program in compliance with 40 CFR § 257.95.

1.1.2 40 CFR § 257.90(e)(6)(ii) – Status of Monitoring Program at End of Reporting Period

At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in § 257.95.

At the end of the current annual reporting period (31 December 2024), the EAP was operating under an assessment monitoring program in compliance with 40 CFR § 257.95.

1.1.3 40 CFR § 257.90(e)(6)(iii) – Statistically Significant Increases

If it was determined that there was a statistically significant increase over background for one or more constituents listed in appendix III to this part pursuant to § 257.94(e).

1.1.3.1 40 CFR § 257.90(e)(6)(iii)(A)

Identify those constituents listed in appendix III to this part and the names of the monitoring wells associated with such an increase.

The EAP was operating under an assessment monitoring program throughout 2024; therefore, no statistical evaluations were conducted on Appendix III constituents in 2024.

1.1.3.2 40 CFR § 257.90(e)(6)(iii)(B)

Provide the date when the assessment monitoring program was initiated for the CCR unit.

An assessment monitoring program was established on 15 August 2018 for the EAP to meet the requirements of 40 CFR § 257.95. The EAP has remained in assessment monitoring since that time.

1.1.4 40 CFR § 257.90(e)(6)(iv) – Statistically Significant Levels

If it was determined that there was a statistically significant level above the groundwater protection standard for one or more constituents listed in appendix IV to this part pursuant to § 257.95(g) include all of the following.

1.1.4.1 40 CFR § 257.90(e)(6)(iv)(A) – Statistically Significant Level Constituents

Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase.

Statistical analyses of Appendix IV constituents were completed in 2024 following the November 2023 and May 2024 semiannual assessment monitoring events as described in 40 CFR § 257.93(h)(2) and statistically significant levels (SSLs) of molybdenum were identified downgradient of the EAP at monitoring well CCR-AP-5. A summary of statistical analysis is provided in Appendix A.

1.1.4.2 40 CFR § 257.90(e)(6)(iv)(B) – Initiation of the Assessment of Corrective Measures

Provide the date when the assessment of corrective measures was initiated for the CCR unit.

Assessment of corrective measures was initiated on 15 May 2019 for the EAP.

1.1.4.3 40 CFR § 257.90(e)(6)(iv)(C) – Assessment of Corrective Measures Public Meeting

Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit.

The public was given the opportunity to comment on the assessment of corrective measures prepared for the EAP during a public meeting held on 18 October 2021.

1.1.4.4 40 CFR § 257.90(e)(6)(iv)(D) – Completion of the Assessment of Corrective Measures

Provide the date when the assessment of corrective measures was completed for the CCR unit.

The assessment of corrective measures was completed on 13 September 2019 and placed into the facility's Operating Record, posted to the publicly available website, and the notification was sent to the state agency.

1.1.5 40 CFR § 257.90(e)(6)(v) – Selection of Remedy

Whether a remedy was selected pursuant to § 257.97 during the current annual reporting period, and if so, the date of remedy selection.

The selection of remedy required under 40 CFR § 257.97 was ongoing in 2024 for molybdenum at the EAP. A summary of actions completed associated with selection of remedy are provided in the March 2024 and September 2024 Semi-Annual Remedy Selection Progress Reports.

Information collected through prior field investigations is being used to evaluate and design an alternative remedy, as well as update the groundwater conceptual model for the EAP.

1.1.6 40 CFR § 257.90(e)(6)(vi) – Remedial Activities

Whether remedial activities were initiated or are ongoing pursuant to § 257.98 during the current annual reporting period.

Closure of the EAP by source removal was initiated in November 2023 and is anticipated to be part of the remedy; however, the selection of remedy has not yet been completed due to ongoing work to analyze remedial activities for site suitability. Remedial activities were not initiated in 2024; therefore, no demonstration or certification is applicable for this unit.

1.2 40 CFR § 257.90(a)

Except as provided for in § 257.100 for inactive CCR surface impoundments, all CCR landfills, CCR surface impoundments, and lateral expansions of CCR units are subject to the groundwater monitoring and corrective action requirements under § 257.90 through § 257.98.

The EAP is subject to the groundwater monitoring and corrective action requirements described under 40 CFR § 257.90 through 40 CFR § 257.98 (the Rule). The remainder of this document addresses the specific requirements for the Owner/Operator to prepare an Annual Groundwater Monitoring and Corrective Action Report per 40 CFR § 257.90(e).

1.3 40 CFR § 257.90(e) – SUMMARY

Annual groundwater monitoring and corrective action report. For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. For new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, the owner or operator must prepare the initial annual groundwater monitoring and corrective action report no later than January 31 of the year following the calendar year a groundwater monitoring system has been established for such CCR unit as required by this subpart, and annually thereafter. For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section, the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by § 257.105(h)(1).

This *2024 Annual Groundwater Monitoring and Corrective Action Report* documents the activities completed in 2024 for the EAP as required by the Rule. Semiannual groundwater sampling and analysis was conducted per the requirements described in 40 CFR § 257.93, and the status of the groundwater monitoring program described in 40 CFR § 257.95 is provided in this report. Field forms for the groundwater sampling events are provided in Appendix B. Laboratory analytical reports are provided in Appendix C.

1.3.1 Status of the Groundwater Monitoring Program

Following completion of the Assessment of Corrective Measures in September 2019, a semiannual groundwater sampling plan was implemented to satisfy requirements of 40 CFR § 257.95(b) and § 257.95(d)(1). During the 2024 reporting period, groundwater samples were collected from the monitoring wells at the EAP from 7 to 13 May 2024 and again from 13 to 15 November 2024. Groundwater monitoring well location and construction details for the existing monitoring well network are summarized in Table 1.

Statistical analysis of Appendix IV constituents collected during the November 2023 sampling event was completed on 25 April 2024, within 90-days following the receipt of laboratory analytical results on 26 January 2024, per the requirements of 40 CFR § 257.93(h)(2). Statistical analysis of Appendix IV constituents collected during the May 2024 sampling event was completed on 17 September 2024, within 90-days following the receipt of laboratory analytical results on 19 June 2024, per the requirements of 40 CFR § 257.93(h)(2). Statistical analysis of Appendix IV constituents collected during the November 2024 sampling event will be completed within the 2025 reporting period and will be included in the 2025 annual report.

Statistical analysis of Appendix IV constituents during the 2024 reporting period determined that SSLs of molybdenum continue to be observed downgradient of the EAP, which is consistent with previous findings. The selection of remedy process required under 40 CFR § 257.97 was still on-going, as discussed in Section 1.1.5, during the 2024 reporting period.

1.3.2 Key Actions Completed

The following key actions were completed in 2024:

- 3 January 2024 – Removed pressure transducers at the EAP after encountering technical difficulties with data collection. Groundwater level data collected over deployment period are presented in Appendix D.
- 30 January 2024 – Prepared *2023 Annual Groundwater Monitoring and Corrective Action Report* (2023 Annual Report) including:
  - Pursuant to 40 CFR § 257.105(h)(1), the 2023 Annual Report was placed in the facility's operating record on 30 January 2024;
  - Pursuant to 40 CFR § 257.106(h)(1), the notification was sent to the relevant State Director and/or Tribal authority within 30 days of the 2023 Annual Report being placed in the facility's operating record [40 CFR § 257.106(d)];
  - Pursuant to 40 CFR § 257.107(h)(1), the 2023 Annual Report was posted to the CCR Website within 30 days of the 2023 Annual Report being placed in the facility's operating record [40 CFR § 257.107(d) and § 257.107(h)(1)];
- 25 April 2024 – Completed statistical analysis of November 2023 assessment monitoring laboratory analytical results received on 26 January 2024.
- 15 March 2024 – Prepared semiannual selection of remedy progress report in accordance with 40 CFR § 257.97(a) to document progress. The semiannual progress report was placed in the operating record as required by 40 CFR § 257.105(h)(12) and posted on the facility's publicly available website as required by 40 CFR § 257.107(h)(9).
- 2 to 4 May 2024 – Completed routine maintenance of monitoring well network including re-development of select wells to address observations of elevated turbidity.

- 6 May 2024 – Static water level measurements were collected in a synoptic gaging at the beginning of the May 2024 sampling event and again immediately prior to collecting each sample to evaluate groundwater flow direction and rate per the requirements of 40 CFR § 257.93(c).
- 23 to 25 May 2023 – Collected groundwater samples from monitoring wells at the EAP for laboratory analysis in accordance with 40 CFR § 257.95.
- 11 June 2024 – Installed pressure transducers in select monitoring wells around the EAP to temporarily monitor groundwater fluctuations related to construction dewatering. Groundwater level data is included in Appendix D.
- 11 September 2024 – Prepared semiannual selection of remedy progress report in accordance with 40 CFR § 257.97(a) to document progress. The semiannual progress report was placed in the operating record as required by 40 CFR § 257.105(h)(12) and posted on the facility's publicly available website as required by 40 CFR § 257.107(h)(9).
- 17 September 2024 – Completed statistical analysis of May 2024 assessment monitoring laboratory analytical results received on 19 June 2024.
- 11 November 2024 – Static water level measurements were collected in a synoptic gaging at the beginning of the November 2024 sampling event and again immediately prior to collecting each sample to evaluate groundwater flow direction and rate per the requirements of 40 CFR § 257.93(c).
- 13 November 2024 – Removed pressure transducers from monitoring wells at the EAP. Groundwater level data collected over deployment period are presented in Appendix D.
- 13 to 15 November 2024 – Collected groundwater samples from monitoring wells at the EAP for laboratory analysis in accordance with 40 CFR § 257.95.

1.3.3 Problems Encountered

Problems encountered during the November 2024 sampling events include:

- Prior to the November 2024 sampling event, monitoring well CCR-AP-5I was damaged during construction activities on site. The monitoring well was inaccessible for the November 2024 synoptic water level gauging.
- Monitoring well CCR-AP-6 was determined to be dry during the November 2024 sampling event and a sample could not be collected.
- Monitoring wells CCR-AP-3, CCR-AP-8 and CCR-AP-8I were temporarily inaccessible during the November 2024 sampling event due to on-site construction activities and health and safety concerns related to pond closure.

1.3.4 Actions to Resolve Problems

Confirmation samples were collected on 22 December 2023 at CCR-AP-1R for radium analysis following the November 2023 sampling event to verify initial results obtained. Confirmation sample results remained elevated, and results were included in the November 2023 statistical analysis and are provided in Table 2. Radium results remained slightly elevated at CCR-AP-1R during the May 2024 sampling event and have returned to normal baseline as of the November 2024 sampling event. Radium will continue to be monitored closely at monitoring well CCR-AP-1R.

Monitoring well CCR-AP-6 was observed to be dry as a result of construction dewatering efforts associated with the ongoing EAP closure-by-removal. Water levels are expected to recover following the termination of dewatering activities, and therefore, no action is required at this time.

Monitoring well CCR-AP-5I was assessed for damage by downhole camera and verified to be intact below the ground surface, with damage being limited to the surface finishing. The monitoring well was re-developed and sampled on 19 December 2024, and surface finishing was repaired by a licensed driller on 23 December 2024.

Monitoring wells CCR-AP-8, CCR-AP-8I, and CCR-AP-3 locations were inaccessible during the November 2024 sampling event due to obstructions related to EAP closure activities coupled with health and safety concerns. Location CCR-AP-8I was able to be accessed and sampled on 19 December 2024. Efforts to complete sampling at monitoring well locations CCR-AP-3 and CCR-AP-8 are still ongoing at the close of the 2024 reporting period, and results will be included in the 2025 annual report.

1.3.5 Project Key Activities for Upcoming Year

Key activities to be completed in 2025 include the following:

- Continue semiannual groundwater monitoring in accordance with 40 CFR § 257.95.
- Complete statistical analyses of the semiannual groundwater sampling results within 90-days of sampling and analysis as required by 40 CFR § 257.93(h)(2).
- Select a remedy that, at a minimum, meets the standards outlined in 40 CFR § 257.97(b) and considers the evaluation factors in 40 CFR § 257.97(c).
- As part of the selected remedy the Southern Indiana Gas and Electric Company will develop a schedule for implementing and completing remedial activities as defined in 40 CFR § 257.97(d).
- Prepare semiannual and annual progress reports, as necessary, describing the progress in selecting and designing the remedy as outlined in 40 CFR § 257.97(a).
- Following remedy selection initiate remedial activities and implement the corrective action groundwater monitoring program as outlined in 40 CFR § 257.98.

1.4 40 CFR § 257.90(e) – INFORMATION

At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available.

1.4.1 40 CFR § 257.90(e)(1)

A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit.

As required by 40 CFR § 257.90(e)(1), a map showing the location of the EAP and associated upgradient, downgradient and nature and extent monitoring wells is presented on Figure 1. Groundwater elevation contours for the May 2024 sampling event are presented on Figure 2. Groundwater elevation contours for the November 2024 sampling event are presented on Figure 3.

1.4.2 40 CFR § 257.90(e)(2)

Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.

No monitoring wells were installed or decommissioned during the 2024 reporting period.

1.4.3 40 CFR § 257.90(e)(3)

In addition to all the monitoring data obtained under § 257.90 through § 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs.

In accordance with 40 CFR § 257.95(b) and § 257.95(d)(1), two independent samples from each background and downgradient monitoring well were collected and analyzed. A summary table including the sample names, dates of sample collection, reason for sample collection (detection or assessment), and monitoring data obtained for the groundwater monitoring program for the EAP is presented in Table 2.

1.4.4 40 CFR § 257.90(e)(4)

A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels).

Statistical analysis of Appendix IV constituents was completed for the November 2023 and May 2024 sampling events as described in 40 CFR § 257.93(h)(2) and demonstrate that molybdenum remains the only constituent at a SSL to be observed downgradient of the EAP, which is consistent with previous results. As a result, the monitoring program did not change, and the EAP remained in assessment monitoring throughout 2024. Statistical analysis for the November 2024 sampling event is ongoing and will be completed within 90 days after sampling and analysis to determine if a statistically significant increase over background has occurred.

1.4.5 40 CFR § 257.90(e)(5)

Other information required to be included in the annual report as specified in § 257.90 through § 257.98.

Other information including development of groundwater protection standards, recording of groundwater monitoring results in the operating record, and an evaluation of alternate sources was discussed in prior annual reports.

TABLES

TABLE 1
GROUNDWATER MONITORING WELL LOCATION AND CONSTRUCTION DETAILS
EAST ASH POND
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

Well ID	Date Installed	Easting	Northing	Top of Pad Elevation (ft NAVD88)	Top of Riser Elevation (ft NAVD88)	Surface Grout (ft bgs)	Bentonite (ft bgs)	Sand Pack (ft bgs)	Screen Zone (ft bgs)	Top of Screen (ft NAVD88)	Bottom of Screen (ft NAVD88)	Screen Length (ft)	Well Radius (in)	Status
Background Wells														
CCR-AP-1R	March 2016	2883429.87	969939.89	438.20	441.64	1.0 - 51.0	51.0 - 53.0	53.0 - 65.0	55.0 - 65.0	383.5	373.5	10	2	Active
CCR-AP-7	March 2016	2883090.62	970774.82	429.50	432.41	1.0 - 16.0	16.0 - 18.0	18.0 - 30.0	20.0 - 30.0	409.5	399.5	10	2	Active
CCR-AP-9	February 2017	2883998.88	969768.96	445.58	448.53	1.0 - 56.0	56.0 - 58.0	58.0 - 70.0	60.0 - 70.0	385.6	375.6	10	2	Active
East Ash Pond Wells														
CCR-AP-2	December 2015	2884168.88	969117.46	394.40	394.02	1.0 - 30.5	30.5 - 32.5	32.5 - 45.0	36.0 - 46.0	358.4	348.4	10	2	Active
CCR-AP-3	December 2015	2883542.17	969007.88	395.00	394.55	1.0 - 31.0	31.0 - 32.8	32.8 - 45.0	35.0 - 45.0	360.0	350.0	10	2	Active
CCR-AP-4	December 2015	2883281.67	969641.72	395.40	394.98	1.0 - 19.7	19.7 - 22.5	23.0 - 35.5	25.5 - 35.5	369.9	359.9	10	2	Active
CCR-AP-5	December 2015	2884016.86	969379.74	394.90	394.38	1.0 - 28.6	28.6 - 30.6	30.6 - 44.0	34.0 - 44.0	360.9	350.9	10	2	Active
CCR-AP-5I	January 2019	2884022.43	969377.35	394.90	394.59	1.0 - 71.2	71.2 - 73.0	73.0 - 86.0	75.3 - 85.3	319.6	309.3	10	2	Active
CCR-AP-6	March 2016	2883285.02	969122.07	397.10	396.75	1.0 - 31.5	31.5 - 33.0	33.5 - 45.5	35.5 - 45.5	361.6	351.6	10	2	Active
CCR-AP-6I	November 2018	2883289.37	969119.68	397.20	396.88	1.0 - 60.7	60.7 - 62.7	62.7 - 64.7	64.7 - 74.7	332.5	322.2	10	2	Active
CCR-AP-8	February 2017	2883846.86	969045.93	394.00	393.68	1.0 - 31.5	31.5 - 33.0	33.5 - 45.5	35.5 - 45.5	358.5	348.5	10	2	Active
CCR-AP-8I	November 2018	2883853.30	969046.82	393.80	393.46	1.0 - 53.7	53.7 - 56.7	56.7 - 69.0	58.7 - 68.7	334.8	324.8	10	2	Active
CCR-AP-10	January 2019	2883772.84	969536.11	--	402.40	1.0 - 36.5	36.5 - 38.0	38.0 - 50.5	40.2 - 50.2	362.2	352.2	10	2	Abandoned[1]
CCR-AP-11	January 2019	2884485.51	969352.71	--	385.10	1.0 - 40.0	40.0 - 41.8	41.8 - 54.7	44.4 - 54.4	340.7	330.7	10	2	Active
2022 Aquifer Performance Test Wells														
CCR-PW-1	July 2022	2883797.21	969046.55	394.80	394.40	0.0 - 37.0	37.0 - 43.0	43.0 - 70.0	50.0 - 70.0	344.8	324.8	20	16	N/A
CCR-OW-1	June 2022	2883701.02	969027.17	395.00	394.62	0.0 - 1.5	1.5 - 4.4	34.0 - 48.0	36.0 - 46.0	359.0	349.0	10	2	N/A
CCR-OW-1I	June 2022	2883704.95	969027.17	394.90	394.44	0.0 - 1.5	1.5 - 58.0	58.0 - 70.4	60.0 - 70.0	334.9	324.9	10	2	N/A
CCR-OW-2	June 2022	2883773.63	969041.30	394.40	393.97	0.0 - 1.5	1.5 - 33.0	33.0 - 46.0	34.0 - 44.0	360.4	350.4	10	2	N/A
CCR-OW-2I	July 2022	2883777.40	969042.58	394.20	394.08	0.0 - 1.5	1.5 - 54.0	54.0 - 68.0	56.0 - 66.0	338.2	328.2	10	2	N/A
CCR-OW-3	June 2022	2883807.86	969047.93	393.90	393.69	0.0 - 1.5	1.5 - 34.0	34.0 - 47.0	35.0 - 45.0	358.9	348.9	10	2	N/A
CCR-OW-3I	June 2022	2883811.66	969048.75	394.00	393.61	0.0 - 1.5	1.5 - 57.0	57.0 - 70.0	58.0 - 68.0	336.0	326.0	10	2	N/A
CCR-OW-4	June 2022	2883872.53	969059.36	394.10	393.77	0.0 - 1.5	1.5 - 34.0	34.0 - 47.0	36.0 - 46.0	358.1	348.1	10	2	N/A
CCR-OW-4I	June 2022	2883876.12	969059.67	394.10	393.86	0.0 - 1.5	1.5 - 55.0	55.0 - 69.0	58.0 - 68.0	336.1	326.1	10	2	N/A
CCR-OW-5I	July 2022	2883799.69	969110.80	392.00	391.65	0.0 - 1.5	1.5 - 51.0	51.0 - 63.0	58.0 - 63.0	334.0	329.0	5	2	N/A

Notes and Abbreviations:

-- = was not surveyed
bgs = below ground surface
ft = feet
in = inches
N/A = not available
NAVD88 = North American Vertical Datum of 1988
[1] *Monitoring well CCR-AP-10 abandoned January 2022*

TABLE 2
SUMMARY OF GROUNDWATER QUALITY DATA - DECEMBER 2023, MAY AND NOVEMBER 2024
EAST ASH POND
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

Location Group	Action Level	Background						
Location Name	GWPS	CCR-AP-1R	CCR-AP-1R	CCR-AP-1R	CCR-AP-7	CCR-AP-7	CCR-AP-9	CCR-AP-9
Sample Name		CCR-AP-1R-20231222	CCR-AP-1R-20240508	CCR-AP-1R-20241114	CCR-AP-7-20240510	CCR-AP-7-20241115	CCR-AP-9-20240508	CCR-AP-9-20241114
Sample Date		12/22/2023	05/08/2024	11/14/2024	05/10/2024	11/15/2024	05/08/2024	11/14/2024
Lab Sample ID		180-167383-1	180-173844-1	180-182961-1	180-173881-1	180-182934-5	180-173844-8	180-182961-6
Detection Monitoring - EPA Appendix III Constituents (mg/L)								
Boron, Total	4	-	**0.75**	**0.79**	0.1 U	0.1 U	**0.39**	**0.41**
Calcium, Total	NA	-	**61**	**55**	**120**	**120**	**130**	**120**
Chloride	NA	-	**32**	**28**	**43**	**43**	**9.6**	**2.5**
Fluoride	4	-	**0.25 J**	**0.4**	**0.31**	**0.41**	**0.3**	**0.15 J**
pH (lab) (pH units)	NA	-	**7.4 J**	**7.4 J**	**7.2 J**	**7.1 J**	**7.2 J**	**7.2 J**
Sulfate	NA	-	**100**	**160**	**110**	**86**	**130**	2.5 U
Total Dissolved Solids (TDS)	NA	-	**480 J**	**700**	**630**	**600**	**2400 J**	**710**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)								
Antimony, Total	0.02	-	**0.00073 J**	**0.001 J**	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic, Total	0.038	-	**0.0059**	**0.011**	**0.0009 J**	**0.0042 J**	**0.0039 J**	**0.0022 J**
Barium, Total	2	-	**0.35**	**0.2**	**0.1**	**0.12**	**0.17**	**0.16**
Beryllium, Total	0.01	-	**0.00095 J**	**0.0015**	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium, Total	0.01	-	0.001 U	**0.00034 J**	0.001 U	**0.000097 J**	0.001 U	**0.000077 J**
Chromium, Total	0.16	-	**0.021**	**0.034**	0.005 U	0.005 U	**0.01**	**0.0065**
Cobalt, Total	0.081	-	**0.013**	**0.018**	**0.0003 J**	**0.00036 J**	**0.0061**	**0.0025**
Fluoride	4	-	**0.25 J**	**0.4**	**0.31**	**0.41**	**0.3**	**0.15 J**
Lead, Total	0.094	-	**0.013**	**0.018**	0.001 U	0.001 U	**0.0047**	**0.0024**
Lithium, Total	0.23	-	**0.036**	**0.067**	**0.011**	**0.0098**	**0.038**	**0.035**
Mercury, Total	0.002	-	0.0002 U	0.0002 U	0.0002 U	**0.00032 J-**	0.0002 U	0.0002 U
Molybdenum, Total	0.1	-	**0.0053**	**0.0056**	**0.0013 J**	**0.0011 J**	**0.0017 J**	**0.0017 J**
Selenium, Total	0.05	-	0.005 U	**0.0013 J**	0.005 U	0.005 U	0.005 U	0.005 U
Thallium, Total	0.01	-	0.001 U	**0.00092 J+**	0.001 U	0.001 U	0.001 U	0.001 U
Radiological (pCi/L)								
Radium-226	NA	**5.36 ± 0.809**	**2.32 ± 0.528**	**1.1 J ± 0.397**	**0.337 ± 0.148**	**0.496 ± 0.169**	**3.35 ± 0.626**	**2.63 ± 0.635**
Radium-228	NA	**9.08 ± 2.49**	**4.98 ± 1.34**	2.28 U ± 1.75	0.529 U ± 0.367	0.358 U ± 0.507	**2.98 J ± 0.969**	3.7 U ± 1.55
Radium-226 & 228	12.6	**14.4 ± 2.62**	**7.3 ± 1.44**	3.38 UJ ± 1.79	**0.866 J ± 0.396**	**0.854 J ± 0.534**	**6.33 J ± 1.15**	**6.33 ± 1.68**
Field Parameters								
Temperature (Deg C)	NA	**12.89**	**19.29**	**15.67**	**17.68**	**15.91**	**18.21**	**17.17**
Dissolved Oxygen, Field (mg/L)	NA	**11.72**	**5.36**	**9.7**	**0.05**	**0.22**	**4.44**	**5.01**
Conductivity, Field (mS/cm)	NA	**1.59**	**0.64758**	**0.15311**	**0.6171**	**1.0125**	**1.165**	**0.74**
Oxidation Reduction Potential (ORP), Field (mv)	NA	**-45**	**103**	**9.7**	**-111.4**	**-101.6**	**65.6**	**313.6**
Turbidity, Field (NTU)	NA	**208**	**351**	**1792**	**28.94**	**5.57**	**464**	**764.02**
pH, Field (pH units)	NA	**6.76**	**7.5**	**5.26**	**7.26**	**7.16**	**6.98**	**8.15**

Notes and Abbreviations:

CCR: Coal Combustion Residuals
mg/L: milligram per liter
pCi/L: picoCurie per liter
Deg C: Degrees Celsius
mS/cm: milliSiemen per centimeter
mv: millivolts
NTU: Nephelometric Turbidity Units
NA: not available
U: not detected, value is the laboratory reporting limit
U: activity level below the Minimum Detectable Concentration (Radiological)
J: value is estimated
J+: value is estimated with a potential high bias
USEPA: United States Environmental Protection Agency
GWPS: Ground Water Protection Standard

*Results in **bold** are detected*
Shaded values indicate a GWPS exceedance

USEPA. 2020. Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. December 14. 40 CFR Part 257.
https://www.epa.gov/coalash/coal-ash-rule

TABLE 2
SUMMARY OF GROUNDWATER QUALITY DATA - DECEMBER 2023, MAY AND NOVEM
EAST ASH POND
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

Location Group	Action Level	Downgradient									
Location Name	GWPS	CCR-AP-2	CCR-AP-2	CCR-AP-3	CCR-AP-4	CCR-AP-4	CCR-AP-5	CCR-AP-5	CCR-AP-5	CCR-AP-5	CCR-AP-5I
Sample Name		CCR-AP-2-20240508	CCR-AP-2-20241114	CCR-AP-3-20240507	CCR-AP-4-20240508	CCR-AP-4R-20241114	CCR-AP-5-20240513	DUP 1-20240513	CCR-AP-5-20241114	DUP 1-20241114	CCR-AP-5I-20240513
Sample Date		05/08/2024	11/14/2024	05/07/2024	05/08/2024	11/14/2024	05/13/2024	05/13/2024	11/14/2024	11/14/2024	05/13/2024
Lab Sample ID		180-173844-2	180-182961-2	180-173844-3	180-173844-4	180-182961-3	180-174082-1	180-174082-3	180-182961-4	180-182961-8	180-174082-2
Detection Monitoring - EPA Appendix III Constituents (mg/L)											
Boron, Total	4	**8.1**	**9.2**	**0.28**	**1.1**	**0.58**	**17**	**17**	**11**	**12**	**12**
Calcium, Total	NA	**230**	**230**	**150**	**130**	**140**	**260**	**260**	**200**	**200**	**270**
Chloride	NA	**250**	**190**	**27**	**32**	**26**	**150**	**160**	**51**	**54**	**280**
Fluoride	4	**0.27**	**0.24**	**0.35**	**0.61**	**0.89**	**0.84**	**0.83**	**1.7**	**1.8**	**0.32**
pH (lab) (pH units)	NA	**6.7 J**	**6.8 J**	**7.1 J**	**7 J**	**6.9 J**	**7.1 J**	**7.1 J**	**7.7 J**	**7.6 J**	**6.9 J**
Sulfate	NA	**340**	**420**	**32**	**73**	**12**	**620**	**640**	**450**	**450**	**640**
Total Dissolved Solids (TDS)	NA	**1500 J**	**1500**	**730 J**	**690 J**	**740**	**1600 J**	**1700**	**1200**	**1200**	**1800 J**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)											
Antimony, Total	0.02	**0.0011 J**	0.002 U	0.002 U	0.002 U	**0.00096 J**	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic, Total	0.038	**0.025**	**0.0021 J**	**0.051**	**0.027**	**0.089**	**0.00085 J**	0.005 U	**0.0013 J**	**0.0015 J**	0.005 U
Barium, Total	2	**0.83**	**0.045**	**0.38**	**0.53**	**0.52**	**0.046**	**0.045**	**0.053**	**0.051**	**0.027**
Beryllium, Total	0.01	**0.0037**	0.001 U	0.001 U	0.001 U	**0.00099 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium, Total	0.01	**0.003**	**0.00011 J**	0.001 U	0.001 U	**0.00045 J**	0.001 U	0.001 U	**0.0001 J**	**0.000088 J**	0.001 U
Chromium, Total	0.16	**0.11**	**0.0024 J**	**0.0031 J**	0.005 U	**0.027**	**0.002 J**	0.005 U	0.005 U	0.005 U	0.005 U
Cobalt, Total	0.081	**0.048**	**0.008**	**0.0061**	**0.0028**	**0.014**	**0.0025**	**0.0022**	**0.0023**	**0.0023**	**0.00051 J**
Fluoride	4	**0.27**	**0.24**	**0.35**	**0.61**	**0.89**	**0.84**	**0.83**	**1.7**	**1.8**	**0.32**
Lead, Total	0.094	**0.056**	**0.0013**	**0.00097 J**	0.001 U	**0.019**	**0.00068 J**	0.001 U	0.001 U	0.001 U	0.001 U
Lithium, Total	0.23	**0.085**	**0.0038 J**	**0.0028 J**	**0.0045 J**	**0.02**	**0.056**	**0.058**	**0.08**	**0.083**	**0.035**
Mercury, Total	0.002	**0.00016 J**	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum, Total	0.1	**0.0065**	0.005 U	**0.0093**	**0.017**	**0.0073**	**0.15**	**0.15**	**0.34**	**0.34**	**0.0026 J**
Selenium, Total	0.05	**0.0027 J**	0.005 U	**0.0016 J**	0.005 U	**0.0018 J**	**0.00095 J**	0.005 U	0.005 U	0.005 U	0.005 U
Thallium, Total	0.01	**0.001**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Radiological (pCi/L)											
Radium-226	NA	**1.65 ± 0.442**	0.401 U ± 0.306	**0.4 ± 0.18**	**0.337 ± 0.17**	0.852 U ± 0.379	**0.424 ± 0.286**	0.182 U ± 0.181	0.158 U ± 0.103	0.212 U ± 0.125	**0.249 ± 0.18**
Radium-228	NA	1.57 U ± 0.852	1.42 U ± 1.51	0.495 U ± 0.461	0.869 U ± 0.646	0.598 U ± 1.24	0.452 U ± 0.509	**0.983 ± 0.583**	-0.153 U ± 0.355	0.46 U ± 0.453	**1.08 ± 0.435**
Radium-226 & 228	12.6	**3.22 J+ ± 0.96**	1.82 U ± 1.54	**0.896 J ± 0.495**	**1.21 J ± 0.668**	1.45 UJ ± 1.3	**0.877 J ± 0.584**	**1.17 J ± 0.61**	0.158 UJ ± 0.37	0.673 UJ ± 0.47	**1.33 ± 0.471**
Field Parameters											
Temperature (Deg C)	NA	**18.11**	**14.14**	**20.93**	**18.22**	**14.31**	**18.31**	**18.31**	**14.45**	**14.45**	**18.21**
Dissolved Oxygen, Field (mg/L)	NA	**4.54**	**9.99**	**5.07**	**4.85**	**3.36**	**4.5**	**4.5**	**1.02**	**1.02**	**2.83**
Conductivity, Field (mS/cm)	NA	**2.201**	**0.07**	**1.582**	**1.261**	**0.07**	**2.281**	**2.281**	**1.233**	**1.233**	**2.641**
Oxidation Reduction Potential (ORP), Field (mv)	NA	**71.6**	**60.6**	**-125.2**	**-120.2**	**209.4**	**300.5**	**300.5**	**-59.6**	**-59.6**	**51.8**
Turbidity, Field (NTU)	NA	**9.503**	**0**	**138**	**30**	**0**	**72**	**72**	**11.21**	**11.21**	**120**
pH, Field (pH units)	NA	**8.97**	**7.32**	**6.84**	**6.83**	**7.95**	**7.11**	**7.11**	**7.08**	**7.08**	**6.72**

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NTU: Nephelometric Turbidity Units
NA: not available
U: not detected, value is the laboratory reporting limit
U: activity level below the Minimum Detectable Concentration (Radiological)
J: value is estimated
J+: value is estimated with a potential high bias
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Results in ***bold*** *are detected*
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EAST ASH POND
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

Location Group	Action Level	Down-Gradient						
Location Name	GWPS	CCR-AP-6	CCR-AP-6I	CCR-AP-6I	CCR-AP-8	CCR-AP-8I	CCR-AP-11	CCR-AP-11
Sample Name		CCR-AP-6-20240507	CCR-AP-6I-20240507	CCR-AP-6I-20241113	CCR-AP-8-20240510	CCR-AP-8I-20240508	CCR-AP-11-20240510	CCR-AP-11-20241115
Sample Date		05/07/2024	05/07/2024	11/13/2024	05/10/2024	05/08/2024	05/10/2024	11/15/2024
Lab Sample ID		180-173844-5	180-173844-6	180-182961-5	180-173881-2	180-173844-7	180-173881-3	180-182961-7
Detection Monitoring - EPA Appendix III Constituents (mg/L)								
Boron, Total	4	**0.66**	**15**	**0.14**	**0.13**	**33**	**0.3**	**0.45**
Calcium, Total	NA	**110**	**250**	**46**	**140**	**490**	**120**	**140**
Chloride	NA	**36**	**87**	**31**	**25**	**180**	**26**	**29**
Fluoride	4	**0.37**	**0.13**	**0.2**	**0.22**	**0.12 J**	**0.3**	**0.34**
pH (lab) (pH units)	NA	**7.2 J**	**7.4 J**	**7.6 J**	**7.1 J**	**7.3 J**	**6.5 J**	**6.2 J**
Sulfate	NA	**46**	**430**	**140**	**2.7**	**1100**	**450**	**610**
Total Dissolved Solids (TDS)	NA	**530**	**1200 J**	**350**	**770**	**2400 J**	**900**	**1200**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)								
Antimony, Total	0.02	**0.00082 J**	0.002 U	0.002 U	**0.00064 J**	0.002 U	0.002 U	0.002 U
Arsenic, Total	0.038	**0.057**	**0.0057**	0.005 U	**0.013**	**0.0013 J**	**0.0056**	**0.051**
Barium, Total	2	**0.43**	**0.041**	**0.21**	**0.27**	**0.34**	**0.15**	**0.23**
Beryllium, Total	0.01	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium, Total	0.01	0.001 U	**0.00028 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium, Total	0.16	**0.0027 J**	0.005 U	0.005 U	**0.0039 J**	0.005 U	**0.0016 J**	**0.0021 J**
Cobalt, Total	0.081	**0.0034**	**0.00062 J**	**0.00085 J**	**0.0044**	**0.00065 J**	**0.036**	**0.065**
Fluoride	4	**0.37**	**0.13**	**0.2**	**0.22**	**0.12 J**	**0.3**	**0.34**
Lead, Total	0.094	**0.0012**	0.001 U	0.001 U	**0.003**	0.001 U	**0.00059 J**	**0.00051 J**
Lithium, Total	0.23	**0.0057 J**	**0.083**	**0.0049 J**	**0.0039 J**	**0.17**	**0.0048 J**	**0.0043 J**
Mercury, Total	0.002	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum, Total	0.1	**0.043**	**0.86**	**0.02**	**0.012**	**0.29**	0.005 U	0.005 U
Selenium, Total	0.05	0.005 U	0.005 U	0.005 U	**0.0021 J**	0.005 U	0.005 U	0.005 U
Thallium, Total	0.01	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Radiological (pCi/L)								
Radium-226	NA	**0.541 ± 0.233**	0.159 U ± 0.115	0.0927 U ± 0.106	**0.489 ± 0.21**	**0.804 ± 0.228**	**0.292 ± 0.148**	0.243 U ± 0.163
Radium-228	NA	0.169 U ± 0.446	0.536 U ± 0.37	0.844 U ± 0.465	0.589 U ± 0.508	1.15 U ± 0.572	0.562 U ± 0.348	0.965 U ± 0.656
Radium-226 & 228	12.6	0.71 UJ ± 0.503	0.695 UJ ± 0.387	0.937 UJ ± 0.477	**1.08 J ± 0.55**	**1.95 J+ ± 0.616**	**0.854 J+ ± 0.378**	1.21 UJ ± 0.676
Field Parameters								
Temperature (Deg C)	NA	**19.79**	**18.2**	**19.25**	**18.56**	**19.72**	**21.43**	**12.05**
Dissolved Oxygen, Field (mg/L)	NA	**3.65**	**0.15**	**0.2**	**0.25**	**6.7**	**0.36**	**1.63**
Conductivity, Field (mS/cm)	NA	**1.105**	**1.6373**	**0.46525**	**1.429**	**3.0125**	**1.3368**	**1.1029**
Oxidation Reduction Potential (ORP), Field (mv)	NA	**-146.7**	**-78.3**	**-28.6**	**-76.3**	**-140.1**	**-24.8**	**-57.5**
Turbidity, Field (NTU)	NA	**93**	**1.18**	**0**	**140**	**91.67**	**88.4**	**93.11**
pH, Field (pH units)	NA	**7.19**	**7.37**	**7.38**	**6.9**	**5.68**	**6.26**	**6.33**

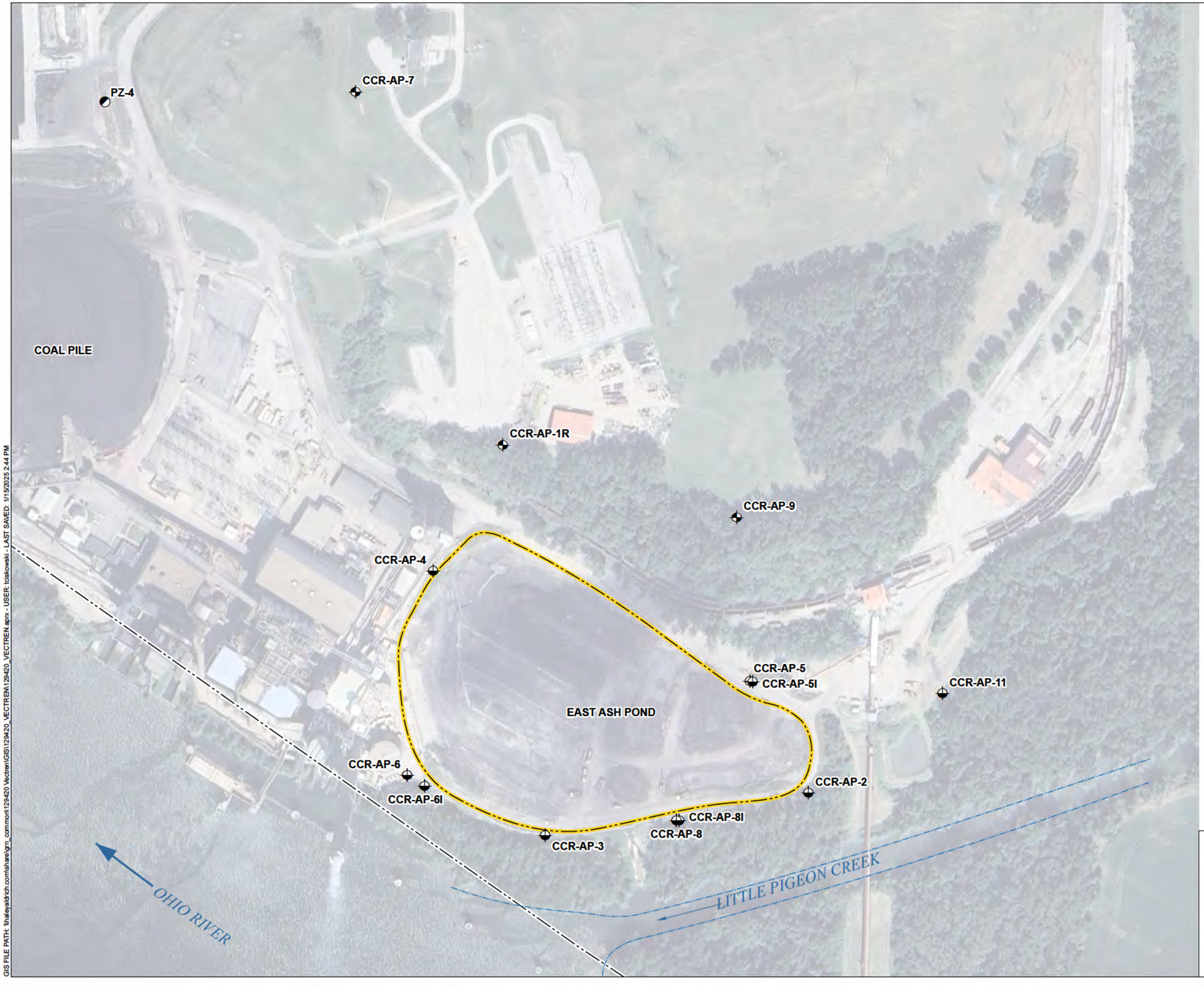
Notes and Abbreviations:

CCR: Coal Combustion Residuals
mg/L: milligram per liter
pCi/L: picoCurie per liter
Deg C: Degrees Celsius
mS/cm: milliSiemen per centimeter
mv: millivolts
NTU: Nephelometric Turbidity Units
NA: not available
U: not detected, value is the laboratory reporting limit
U: activity level below the Minimum Detectable Concentration (Radiological)
J: value is estimated
J+: value is estimated with a potential high bias
USEPA: United States Environmental Protection Agency
GWPS: Ground Water Protection Standard

*Results in **bold** are detected*
Shaded values indicate a GWPS exceedance

USEPA. 2020. Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. December 14. 40 CFR Part 257.
https://www.epa.gov/coalash/coal-ash-rule

FIGURES



LEGEND

- UPGRADIENT MONITORING WELL
- DOWNGRADIENT MONITORING WELL
- PIEZOMETER
- CREEK BOUNDARY
- UNIT BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. CCR = COAL COMBUSTION RESIDUALS
3. AERIAL IMAGERY SOURCE: GOOGLE, 10 AUGUST 2024

N

0 230 460
SCALE IN FEET

HALEY ALDRICH

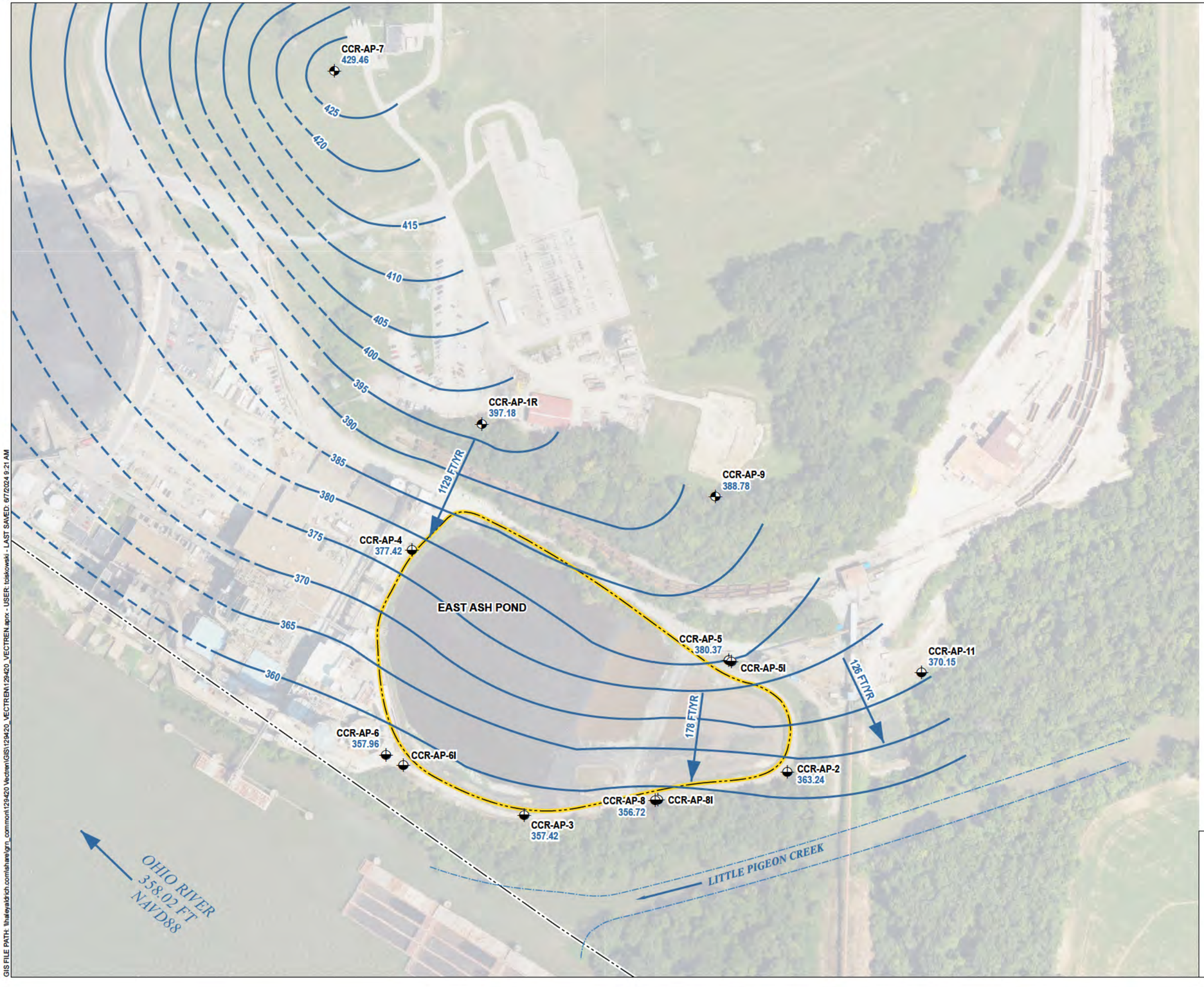
EAST ASH POND
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

GROUNDWATER MONITORING WELL LOCATIONS - EAST ASH POND

JANUARY 2025

FIGURE 1

GIS FILE PATH: \\haleyaldrich.com\share\grn_common\129420 Vectren\GIS\129420_VECTREN\129420_VECTREN aprx - USER: toiskowski - LAST SAVED: 1/15/2025 2:44 PM



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LEGEND

- UPGRADIENT GROUNDWATER MONITORING WELL
- DOWNGRADIENT GROUNDWATER MONITORING WELL
- GROUNDWATER FLOW DIRECTION
- CREEK BOUNDARY
- GROUNDWATER ELEVATION CONTOUR, 5-FT INTERVAL, DASHED WHERE INFERRED
- APPROXIMATE UNIT BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. DEFINITIONS:
CCR = COAL COMBUSTION RESIDUALS
ND = NO DATA
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

3. WATER LEVELS GAGED ON 6 MAY 2024

4. OHIO RIVER LEVEL COLLECTED BY USGS OWENSBORO GAGE #03303502 ON 6 MAY 2024 AT 12:00 PM

5. GROUNDWATER VELOCITY SHOWN IN FEET PER YEAR

6. $V = \frac{k(i)}{n_e}$

V = GROUNDWATER VELOCITY (FT/YR)
K = HYDRAULIC CONDUCTIVITY (FT/YR)
i = GROUNDWATER GRADIENT
n_e = EFFECTIVE POROSITY

7. AERIAL IMAGERY SOURCE: HEXAGON, 25 JULY 2023

N

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SCALE IN FEET

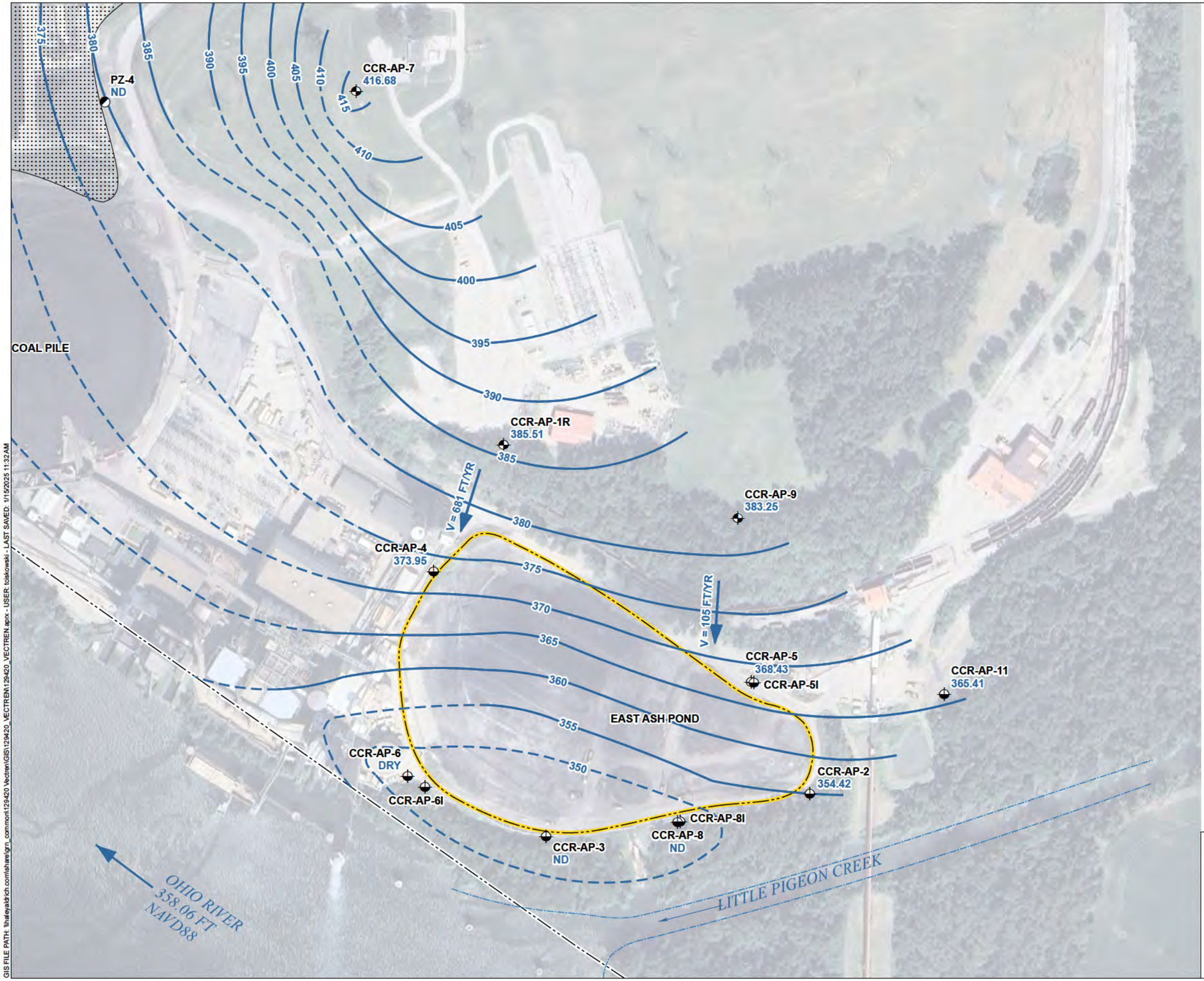
HALEY ALDRICH

EAST ASH POND
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

SHALLOW GROUNDWATER CONFIGURATION - EAST ASH POND - MAY 2024

JANUARY 2025

FIGURE 2



GIS FILE PATH: \\haleyaldrich.com\share\grn_common\129420 Vectren\GIS\129420_VECTREN129420_VECTREN.aprx - USER: tcakowski - LAST SAVED: 1/15/2025 11:32 AM

LEGEND

- UPGRADIENT MONITORING WELL
- DOWNGRADIENT MONITORING WELL
- PIEZOMETER
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR, 5-FT INTERVAL, DASHED WHERE INFERRED
- CREEK BOUNDARY
- APPROXIMATE LIMITS OF WEST ASH POND CCR REMOVAL
- UNIT BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. DEFINITIONS:
CCR = COAL COMBUSTION RESIDUALS
ND = NO DATA
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

3. WATER LEVELS GAGED ON 11 NOVEMBER 2024.

4. OHIO RIVER LEVEL COLLECTED BY USGS OWENSBORO GAGE #03303502 ON 11 NOVEMBER 2024 AT 12:00 PM.

5. GROUNDWATER VELOCITY SHOWN IN FEET PER YEAR.

6. $V = \frac{k(i)}{n_e}$

V = GROUNDWATER VELOCITY (FT/YR)
K = HYDRAULIC CONDUCTIVITY (FT/YR)
i = GROUNDWATER GRADIENT
n_e = EFFECTIVE POROSITY

7. AERIAL IMAGERY SOURCE: GOOGLE, 10 AUGUST 2024

N

0 230 460
SCALE IN FEET

HALEY ALDRICH

EAST ASH POND
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

SHALLOW GROUNDWATER CONFIGURATION - EAST ASH POND NOVEMBER 2024

JANUARY 2025

FIGURE 3

APPENDIX A
Summary of Statistical Analysis

HALEY & ALDRICH, INC.
400 Augusta St.
Suite 100
Greenville, SC. 29601
864.214.8771

TECHNICAL MEMORANDUM

25 April 2024
File No. 0129420-032

TO: Southern Indiana Gas and Electric Company

FROM: Haley & Aldrich, Inc.
Todd Plating, Senior Project Manager
Steven F. Putrich, P.E., Project Principal

SUBJECT: Statistical Evaluation of the November 2023 Semi-annual Groundwater Assessment Monitoring Data
Southern Indiana Gas and Electric Company
East Ash Pond
F.B. Culley Generating Station; Warrick County, Indiana

Pursuant to Title 40 Code of Federal Regulations (40 CFR) § 257.93 and § 257.95 (Rule), this memorandum summarizes the statistical evaluation of the analytical results for the November 2023 semi-annual assessment monitoring event for the F.B. Culley Generating Station (FBC) East Ash Pond (EAP). Haley & Aldrich, Inc. (Haley & Aldrich) completed this statistical evaluation to determine if Appendix IV groundwater monitoring constituents have been detected in downgradient wells at statistically significant levels (SSL) greater than Groundwater Protection Standards (GWPS), consistent with the requirements in 40 CFR § 257.95.

Methods used during this statistical analysis are described in Haley & Aldrich's 2017 *Statistical Data Analysis Plan for the F.B. Culley Generating Station*. A summary of how applicable performance standards described in 40 CFR § 257.93 (g) were achieved include:

- 40 CFR § 257.93 (g) (1) - Data set distribution was evaluated using basic summary statistics, graphical methods, and the Shapiro-Wilks Test of Normality. Parametric methods were used where normal distributions were identified. Those data sets were evaluated for outliers using box plots, Dixon's test and Rosner's test. Outlier identification and data set distribution groups are summarized in Attachment A.
- 40 CFR § 257.93 (g) (2) – Not applicable
- 40 CFR § 257.93 (g) (3) – Not applicable

- 40 CFR § 257.93 (g) (4) – Levels of confidence and additional supporting information for the use of tolerance intervals and prediction limits are included in Attachment A.
- 40 CFR § 257.93 (g) (5) – Non-detect values were accounted for by simple substitution, where the detection limit replaced the non-detect result. Non-detect values are identified and summarized in Attachment A.
- 40 CFR § 257.93 (g) (6) – Time series plots for groundwater monitoring wells included in this evaluation were reviewed to identify potential seasonal variability. No additional statistics to account for seasonality of spatial variability were necessary.

Data from the groundwater sampling event for the downgradient monitoring wells (CCR-AP-2 through CCR-AP-6 and CCR-AP-8) were compared to the GWPS established from the background dataset for the upgradient monitoring wells (CCR-AP-1R, CCR-AP-7, and CCR-AP-9) for detected Appendix IV constituents. GWPS for each of the Appendix IV constituents have been set equal to the highest value of the maximum contaminant level (MCL), regional screening level (RSL), or background concentration. The results of the assessment monitoring statistical evaluation are discussed below and provided in Attachment A.

Development of Groundwater Protection Standard

The Rule provides four specific options for statistical evaluation of groundwater quality data collected at a coal combustion residual (CCR) unit (40 CFR §257.93(f) (1-4)). Haley & Aldrich certified the tolerance limit (TL) as the statistical method used for developing background concentration for the GWPS on 14 January 2019. As noted above, the GWPS for each of the Appendix IV constituents have been set equal to the highest value of the MCL, RSL, or background concentration. The most recent groundwater sampling result from each compliance well was compared to the GWPS to determine if additional statistical testing is warranted.

STATISTICAL EVALUATION

An interwell statistical evaluation was used to identify SSLs (Table 1). An interwell evaluation compares the most recent values from downgradient compliance wells to a background dataset composed of upgradient well data. Because the CCR unit is in assessment monitoring, no statistical evaluations were conducted on Appendix III (detection monitoring) constituents.

The parametric TL method was used to complete statistical evaluations of the referenced dataset. The TL procedure is one in which a concentration limit for each constituent is established from the distribution of the background data, with a minimum 95 percent confidence level. The upper endpoint of a tolerance interval is called the UTL. Depending on the data distribution, parametric or non-parametric TL procedures are used to evaluate groundwater monitoring data. Parametric TLs utilize normally distributed data or data normalized via a transformation of the sample background data used to construct the limit. If the data are non-normal and a transformation is not indicated, non-parametric procedures (order statistics or bootstrap methods) are used to calculate the TL. If all the background data are non-detect, a maximum reporting limit may serve as an appropriate UTL.

These statistical evaluations were conducted using the background dataset for all detected Appendix IV constituents using parametric TL. If an Appendix IV constituent concentration from the November 2023 sampling event was greater than the GWPS, the lower confidence limit (LCL) for the downgradient well constituent was used to evaluate if an SSL was indicated. The LCL is the lower end of the confidence interval range, which is an estimated concentration range intended to contain the true mean or median of the population from which the sample is drawn. The confidence interval range is designed to locate the true population mean or median with a high degree of statistical confidence, or conversely, with a low probability of error.

The UTLs were calculated from the background well dataset using the EnvStats (version 2.8.1) R programming package after testing for outlier sample results that would warrant removal from the dataset based on likely error in sampling or measurement. Statistical outlier tests for the background data were performed using the outliers (version 0.15) R programming package, and a visual inspection of the data was performed using box plots and distribution plots for the downgradient sample data. No sample data were identified as outliers that warranted removal from the dataset.

BACKGROUND DISTRIBUTIONS

The groundwater analytical results for each sampling event from the background sample locations were combined to calculate the UTL for each detected Appendix IV constituent. The variability and distribution of the pooled dataset was evaluated to determine the method for UTL calculation. The background concentrations were periodically updated per the document *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009* (Unified Guidance).

TREND SUMMARY

Mann Kendall trend analyses were performed on data sets from downgradient wells of sufficient sample size. Results of the trend analysis are included as Table 2. Trends indicated for constituents identified as SSLs are summarized below:

- Molybdenum was determined to be increasing at monitoring well locations CCR-AP-2 and CCR-AP-4R. Analytical results at those locations are below the GWPS.
- Molybdenum was determined to be stable at upgradient location CCR-AP-1R and downgradient locations CCR-AP-6 and CCR-AP-8.
- Molybdenum was determined to be decreasing at upgradient locations CCR-AP-7 and CCR-AP-9, along with downgradient locations CCR-AP-3 and CCR-AP-5.

RESULTS OF APPENDIX IV DOWNGRADIENT STATISTICAL COMPARISONS

The sample concentrations from the downgradient wells for each of the detected Appendix IV constituents from the November 2023 assessment monitoring event were compared to their respective GWPS (Attachment A). LCLs were calculated where constituents were detected at concentrations greater than the GWPS. An SSL is indicated when the LCL is greater than the GWPS. SSLs are summarized in the table below. Based on previous compliance sampling events and statistical evaluations, interwell comparisons were used to evaluate constituents not subject to an Alternative

Source Demonstration (ASD) in downgradient monitoring wells. Because a successful ASD was completed for arsenic, an intrawell statistical analysis was used to evaluate that constituent.

The results of the statistical analyses conducted for detected Appendix IV constituents confirm that molybdenum remains the only SSL downgradient of the EAP. As a result, the EAP will remain in Assessment Monitoring.

Table 1. Statistically Significant Level Summary – Appendix IV Constituents

Location ID	Trend	Constituent	Newly Identified SSL	Concentration (mg/L)
CCR-AP-5	Decrease	Molybdenum	No	0.14

Notes:
mg/L= milligrams per liter

Enclosure:

Table 2 – Trend Summary
Attachment A - Assessment Monitoring Statistical Analysis Summary – November 2023

G:\129420 Vectren\Deliverables\FB_Culley\East Ash Pond\SSL Notification\2023-11 Nov Sampling SSL Memo\2024-0425 FBC EAP Statistical Evaluation Summary_F.docx

Table 2. Trend Summary

Location	Chemical	Units	Identified Trends		Trend Analysis on All Available Data					Trend Analysis on Recent Data				
			Trend (All Data)	Trend (Recent Data)	Results, n	Detected Results, n	Max Concentration	Sen Slope (magnitude per year)	p-value	*Results, n	*Detected Results, n	*Max Concentration	*Sen Slope (magnitude per year)	*p-value
CCR-AP-1R	Antimony, Total	mg/L	No Trend	Stable	22	16	0.01	1.92e-05	0.41	8	8	0.0041	-8.8e-05	0.618
CCR-AP-2	Antimony, Total	mg/L	No Trend	No Trend	22	13	0.01	2e-05	0.138	8	8	0.0079	0.000105	0.319
CCR-AP-3	Antimony, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	21	5	0.005	NA	NA	8	3	0.005	NA	NA
CCR-AP-4R	Antimony, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	21	7	0.028	NA	NA	8	5	0.028	0.000188	0.61
CCR-AP-5	Antimony, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Probably Increasing	21	6	0.01	NA	NA	8	5	0.0047	0.000172	0.0746
CCR-AP-6	Antimony, Total	mg/L	No Trend	No Trend	21	12	0.018	0	0.636	8	6	0.018	0.000134	0.308
CCR-AP-7	Antimony, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Only one detected result	23	3	0.0025	NA	NA	8	1	0.0025	NA	NA
CCR-AP-8	Antimony, Total	mg/L	Stable	No Trend	21	15	0.0046	-1.77e-05	0.195	8	7	0.0046	2.11e-05	0.902
CCR-AP-9	Antimony, Total	mg/L	No Trend	No Trend	20	15	0.01	0	1	8	6	0.01	-0.000162	0.536
CCR-AP-1R	Arsenic, Total	mg/L	Increasing	Stable	22	22	0.038	0.000708	0.00675	8	8	0.034	-0.001	0.711
CCR-AP-2	Arsenic, Total	mg/L	Increasing	Probably Increasing	22	22	0.048	0.00145	7.69e-05	8	8	0.048	0.005	0.0635
CCR-AP-3	Arsenic, Total	mg/L	Increasing	Stable	21	21	0.095	0.000818	0.0136	8	8	0.095	0	1
CCR-AP-4R	Arsenic, Total	mg/L	Increasing	No Trend	21	21	0.33	0.00618	0.000782	8	8	0.33	0.00325	0.902
CCR-AP-5	Arsenic, Total	mg/L	Increasing	Increasing	20	18	0.024	0.000226	0.00181	8	8	0.024	0.00204	0.00277
CCR-AP-6	Arsenic, Total	mg/L	Increasing	Stable	21	21	0.12	0.00206	0.0117	8	8	0.12	0	0.694
CCR-AP-7	Arsenic, Total	mg/L	Decreasing	Stable	23	23	0.018	-0.000232	0.0173	8	8	0.015	-0.000733	0.135
CCR-AP-8	Arsenic, Total	mg/L	Increasing	Stable	21	21	0.12	0.00294	0.000422	8	8	0.12	-0.00333	0.12
CCR-AP-9	Arsenic, Total	mg/L	No Trend	Stable	20	20	0.032	0.000226	0.153	8	8	0.02	-0.000633	0.454
CCR-AP-1R	Barium, Total	mg/L	Increasing	Stable	22	22	0.59	0.00842	0.0452	8	8	0.32	-0.00667	0.902
CCR-AP-2	Barium, Total	mg/L	Increasing	Increasing	22	22	0.64	0.015	0.00519	8	8	0.64	0.08	0.0187
CCR-AP-3	Barium, Total	mg/L	No Trend	No Trend	21	21	0.49	0.002	0.114	8	8	0.49	0.00167	1
CCR-AP-4R	Barium, Total	mg/L	No Trend	No Trend	21	21	1.4	0.00333	0.628	8	8	1.4	0.0317	0.618
CCR-AP-5	Barium, Total	mg/L	Increasing	Probably Increasing	21	21	0.2	0.00358	0.000124	8	8	0.2	0.0161	0.0635
CCR-AP-6	Barium, Total	mg/L	Stable	Decreasing	21	21	0.69	-0.00258	0.332	8	8	0.69	-0.015	0.0461
CCR-AP-7	Barium, Total	mg/L	Decreasing	Stable	23	23	0.19	-0.00222	0.019	8	8	0.19	-0.00625	0.212
CCR-AP-8	Barium, Total	mg/L	Decreasing	Decreasing	21	21	0.68	-0.01	0.00202	8	8	0.57	-0.0317	0.0461
CCR-AP-9	Barium, Total	mg/L	Increasing	Stable	20	20	0.72	0.00812	0.04	8	8	0.39	-0.00167	1
CCR-AP-1R	Beryllium, Total	mg/L	Increasing	Stable	22	22	0.0066	0.00018	0.00679	8	8	0.0061	-0.000292	0.711
CCR-AP-2	Beryllium, Total	mg/L	Increasing	No Trend	22	22	0.0077	0.00016	0.000244	8	8	0.0077	0.000707	0.386
CCR-AP-3	Beryllium, Total	mg/L	Not Evaluated - Only one detected result	Not Evaluated - Only one detected result	21	1	0.00056	NA	NA	8	1	0.00056	NA	NA
CCR-AP-4R	Beryllium, Total	mg/L	Increasing	Stable	21	15	0.0017	2.13e-05	0.0071	8	4	0.0017	-2.14e-06	0.507
CCR-AP-5	Beryllium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Only one detected result	21	6	0.005	NA	NA	8	1	0.0016	NA	NA
CCR-AP-6	Beryllium, Total	mg/L	No Trend	Not Evaluated - Majority of data (>50%) non-detect	21	13	0.0025	8.82e-06	0.188	8	3	0.00096	NA	NA
CCR-AP-7	Beryllium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Only one detected result	23	7	0.00075	NA	NA	8	1	0.0005	NA	NA
CCR-AP-8	Beryllium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	21	6	0.0005	NA	NA	8	2	0.0005	NA	NA
CCR-AP-9	Beryllium, Total	mg/L	Increasing	Stable	20	19	0.005	4.6e-05	0.021	8	7	0.005	-3.25e-05	0.902
CCR-AP-1R	Cadmium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Decreasing	22	10	0.005	NA	NA	8	6	0.0025	-4.87e-05	0.0354
CCR-AP-2	Cadmium, Total	mg/L	Increasing	No Trend	22	19	0.0066	5.47e-05	0.014	8	8	0.0066	0.000164	0.454
CCR-AP-3	Cadmium, Total	mg/L	Not Evaluated - Only one detected result	Not Evaluated - Only one detected result	21	1	0.0005	NA	NA	8	1	0.0005	NA	NA
CCR-AP-4R	Cadmium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Stable	21	10	0.0025	NA	NA	8	4	0.00079	0	1
CCR-AP-5	Cadmium, Total	mg/L	No Trend	No Trend	21	16	0.005	7.35e-06	0.564	8	5	0.0014	5.88e-05	0.445
CCR-AP-6	Cadmium, Total	mg/L	No Trend	Not Evaluated - Majority of data (>50%) non-detect	21	13	0.0011	0	0.298	8	2	0.0011	NA	NA
CCR-AP-7	Cadmium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	23	2	0.0005	NA	NA	8	0	0.0005	NA	NA
CCR-AP-8	Cadmium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	21	6	0.00064	NA	NA	8	4	0.00064	0	0.592
CCR-AP-9	Cadmium, Total	mg/L	Increasing	Not Evaluated - Majority of data (>50%) non-detect	20	11	0.005	2.36e-05	0.00351	8	2	0.005	NA	NA
CCR-AP-1R	Chromium, Total	mg/L	Increasing	No Trend	22	22	0.16	0.00312	0.0152	8	8	0.11	0.0028	0.902
CCR-AP-2	Chromium, Total	mg/L	Increasing	Increasing	22	22	0.14	0.004	0.000307	8	8	0.14	0.0163	0.0187
CCR-AP-3	Chromium, Total	mg/L	No Trend	No Trend	21	17	0.014	3.61e-05	0.15	8	7	0.014	0.000138	0.618
CCR-AP-4R	Chromium, Total	mg/L	No Trend	No Trend	20	18	0.0493	0.000386	0.144	8	7	0.0493	0.000317	0.902
CCR-AP-5	Chromium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Probably Increasing	21	5	0.056	NA	NA	8	4	0.056	0.00236	0.0842

Abbreviations: CF = confidence facotr; CV = coefficient of variation; mg/L = milligrams per liter; pCi/L = picocuries per liter.

Notes: *Recent data defined as the 8 most recent data points. MK = Mann Kendall Trend Test. Secular Trend Classification based on Aziz (2003) guidance and MK Results. Thiel-Sen slope and p-value evaluated at 95% confidence level to confirm MK trends.

Additional information about trend analysis provided in Attachment A.

			Identified Trends		Trend Analysis on All Available Data					Trend Analysis on Recent Data				
Location	Chemical	Units	Trend (All Data)	Trend (Recent Data)	Results, n	Detected Results, n	Max Concentration	Sen Slope (magnitude per year)	p-value	*Results, n	*Detected Results, n	*Max Concentration	*Sen Slope (magnitude per year)	*p-value
CCR-AP-6	Chromium, Total	mg/L	Stable	No Trend	21	20	0.043	-0.000148	0.545	8	7	0.043	-0.00035	0.536
CCR-AP-7	Chromium, Total	mg/L	No Trend	Not Evaluated - Only one detected result	23	12	0.019	0	0.808	8	1	0.0062	NA	NA
CCR-AP-8	Chromium, Total	mg/L	No Trend	No Trend	20	18	0.014	9.72e-06	0.922	8	7	0.014	-0.000287	0.618
CCR-AP-9	Chromium, Total	mg/L	Increasing	No Trend	20	20	0.15	0.00129	0.0052	8	8	0.045	0.00108	0.803
CCR-AP-1R	Cobalt, Total	mg/L	Increasing	Stable	22	22	0.081	0.00192	0.00523	8	8	0.08	-0.000633	0.902
CCR-AP-2	Cobalt, Total	mg/L	Increasing	Probably Increasing	22	22	0.091	0.00164	5.41e-05	8	8	0.091	0.00774	0.0635
CCR-AP-3	Cobalt, Total	mg/L	Decreasing	No Trend	21	21	0.0094	-0.000195	0.000258	8	8	0.0092	0.0001	0.902
CCR-AP-4R	Cobalt, Total	mg/L	No Trend	Stable	21	21	0.0175	1.44e-05	0.856	8	8	0.0175	-0.000179	0.902
CCR-AP-5	Cobalt, Total	mg/L	Decreasing	Increasing	21	21	0.01	-0.000355	0.00225	8	8	0.01	0.000712	0.0461
CCR-AP-6	Cobalt, Total	mg/L	Stable	Stable	21	21	0.019	-0.000168	0.264	8	8	0.019	-0.000147	0.711
CCR-AP-7	Cobalt, Total	mg/L	Decreasing	No Trend	23	21	0.015	-9e-05	0.013	8	6	0.0049	2.47e-05	0.902
CCR-AP-8	Cobalt, Total	mg/L	Decreasing	Stable	21	21	0.017	-0.000475	0.000275	8	8	0.012	-0.000545	0.536
CCR-AP-9	Cobalt, Total	mg/L	Increasing	Stable	20	20	0.047	0.000341	0.0286	8	8	0.023	0	1
CCR-AP-1R	Fluoride	mg/L	Decreasing	Decreasing	22	22	0.81	-0.00692	0.00594	8	8	0.63	-0.02	0.00609
CCR-AP-2	Fluoride	mg/L	Increasing	No Trend	22	22	0.69	0.0167	0.000171	8	8	0.69	0.03	0.618
CCR-AP-3	Fluoride	mg/L	Stable	Stable	21	20	0.93	-0.0105	0.183	8	8	0.57	-0.0179	0.266
CCR-AP-4R	Fluoride	mg/L	No Trend	No Trend	21	20	0.64	0.005	0.333	8	8	0.64	0.0117	0.902
CCR-AP-5	Fluoride	mg/L	Increasing	No Trend	21	21	2.3	0.05	0.000765	8	8	2.3	0.139	0.258
CCR-AP-6	Fluoride	mg/L	Stable	No Trend	21	21	0.69	-0.00375	0.694	8	8	0.69	0.009	0.902
CCR-AP-7	Fluoride	mg/L	Increasing	No Trend	22	22	0.72	0.00875	0.019	8	8	0.72	0.0267	0.618
CCR-AP-8	Fluoride	mg/L	No Trend	No Trend	21	20	1.1	0.00764	0.238	8	8	1.1	0.0333	0.319
CCR-AP-9	Fluoride	mg/L	No Trend	No Trend	20	20	0.42	0.00172	0.415	8	8	0.39	0.0045	0.618
CCR-AP-1R	Lead, Total	mg/L	Increasing	Stable	22	22	0.094	0.00194	0.00572	8	8	0.078	0.00025	1
CCR-AP-2	Lead, Total	mg/L	Increasing	Increasing	22	22	0.1	0.0025	0.000271	8	8	0.1	0.0101	0.0354
CCR-AP-3	Lead, Total	mg/L	Increasing	No Trend	21	17	0.01	2.23e-05	0.0314	8	7	0.01	0.000132	0.536
CCR-AP-4R	Lead, Total	mg/L	No Trend	Stable	21	21	0.039	0.000167	0.29	8	8	0.039	-0.00045	0.902
CCR-AP-5	Lead, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	21	8	0.02	NA	NA	8	6	0.02	0.000821	0.212
CCR-AP-6	Lead, Total	mg/L	Stable	No Trend	21	21	0.041	-8.22e-05	0.763	8	8	0.041	-4e-05	1
CCR-AP-7	Lead, Total	mg/L	Probably Decreasing	Not Evaluated - Majority of data (>50%) non-detect	23	14	0.02	-3.36e-05	0.0935	8	3	0.006	NA	NA
CCR-AP-8	Lead, Total	mg/L	No Trend	Stable	21	20	0.0076	3.33e-05	0.38	8	7	0.0061	-0.000133	0.711
CCR-AP-9	Lead, Total	mg/L	Increasing	Stable	20	20	0.041	0.000571	0.0193	8	8	0.025	-0.000425	0.803
CCR-AP-1R	Lithium, Total	mg/L	Increasing	No Trend	22	22	0.23	0.004	0.0139	8	8	0.15	0.0049	0.618
CCR-AP-2	Lithium, Total	mg/L	Probably Increasing	Increasing	22	17	0.125	0.0016	0.0508	8	8	0.11	0.0132	0.0187
CCR-AP-3	Lithium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	21	3	0.025	NA	NA	8	3	0.0043	NA	NA
CCR-AP-4R	Lithium, Total	mg/L	Stable	No Trend	21	15	0.047	-0.000219	0.375	8	7	0.025	0.000538	0.536
CCR-AP-5	Lithium, Total	mg/L	Decreasing	No Trend	21	21	0.15	-0.00563	1.3e-05	8	8	0.072	0.00214	0.536
CCR-AP-6	Lithium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	21	10	0.125	NA	NA	8	5	0.018	-0.000182	0.454
CCR-AP-7	Lithium, Total	mg/L	Decreasing	Stable	23	23	0.039	-0.000211	0.006	8	8	0.018	-0.00045	0.711
CCR-AP-8	Lithium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Only one detected result	21	5	0.025	NA	NA	8	1	0.0067	NA	NA
CCR-AP-9	Lithium, Total	mg/L	Increasing	Stable	20	20	0.12	0.000858	0.0345	8	8	0.072	-0.00217	0.711
CCR-AP-1R	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	21	0	0.001	NA	NA	8	0	0.001	NA	NA
CCR-AP-2	Mercury, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Increasing	21	8	0.00071	NA	NA	8	6	0.00071	4.8e-05	0.0327
CCR-AP-3	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	20	0	0.00025	NA	NA	8	0	0.00025	NA	NA
CCR-AP-4R	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	20	0	0.00025	NA	NA	8	0	0.00025	NA	NA
CCR-AP-5	Mercury, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	20	3	0.0016	NA	NA	8	3	0.0016	NA	NA
CCR-AP-6	Mercury, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	20	2	0.00041	NA	NA	8	2	0.00041	NA	NA
CCR-AP-7	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	20	0	0.00025	NA	NA	8	0	0.00025	NA	NA
CCR-AP-8	Mercury, Total	mg/L	Not Evaluated - Only one detected result	Not Evaluated - Only one detected result	20	1	0.00026	NA	NA	8	1	0.00026	NA	NA
CCR-AP-9	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	19	0	0.0001	NA	NA	8	0	0.0001	NA	NA
CCR-AP-1R	Molybdenum, Total	mg/L	Stable	Stable	22	22	0.023	-2.5e-05	0.755	8	8	0.023	-0.000264	0.212
CCR-AP-2	Molybdenum, Total	mg/L	Increasing	No Trend	22	22	0.01	0.000358	2.01e-05	8	8	0.01	0.000533	0.108
CCR-AP-3	Molybdenum, Total	mg/L	Decreasing	No Trend	21	21	0.025	-0.0003	0.0074	8	8	0.025	0.000213	0.803
CCR-AP-4R	Molybdenum, Total	mg/L	Increasing	No Trend	21	18	0.01	0.000113	0.0312	8	5	0.01	0.00025	0.61
CCR-AP-5	Molybdenum, Total	mg/L	Decreasing	Stable	21	21	0.53	-0.0121	0.00266	8	8	0.34	-0.015	0.53
CCR-AP-6	Molybdenum, Total	mg/L	Stable	Stable	21	21	0.037	-7.74e-05	0.738	8	8	0.037	-0.0005	0.454
CCR-AP-7	Molybdenum, Total	mg/L	Decreasing	No Trend	23	22	0.013	-0.00025	1.8e-05	8	7	0.0025	7.32e-05	0.803
CCR-AP-8	Molybdenum, Total	mg/L	Stable	Stable	21	21	0.029	0	0.903	8	8	0.029	-8.33e-05	1
CCR-AP-9	Molybdenum, Total	mg/L	Decreasing	No Trend	20	18	0.025	-0.000292	0.00428	8	6	0.025	-0.00025	0.386
CCR-AP-1R	Radium-226 & 228	pCi/L	No Trend	No Trend	20	20	14.4	0.0993	0.23	8	8	14.4	1.6	0.266
CCR-AP-2	Radium-226 & 228	pCi/L	No Trend	No Trend	20	19	5.53	0.00427	0.974	8	7	5.53	0.252	0.711
CCR-AP-3	Radium-226 & 228	pCi/L	No Trend	No Trend	19	18	4.87	0.0048	1	8	7	4.87	0.189	0.386

Abbreviations: CF = confidence facotr; CV = coefficient of variation; mg/L = milligrams per liter; pCi/L = picocuries per liter.

Notes: *Recent data defined as the 8 most recent data points. MK = Mann Kendall Trend Test. Secular Trend Classification based on Aziz (2003) guidance and MK Results. Thiel-Sen slope and p-value evaluated at 95% confidence level to confirm MK trends.

Additional information about trend analysis provided in Attachment A.

Location	Chemical	Units	Identified Trends		Trend Analysis on All Available Data					Trend Analysis on Recent Data				
			Trend (All Data)	Trend (Recent Data)	Results, n	Detected Results, n	Max Concentration	Sen Slope (magnitude per year)	p-value	*Results, n	*Detected Results, n	*Max Concentration	*Sen Slope (magnitude per year)	*p-value
CCR-AP-4R	Radium-226 & 228	pCi/L	No Trend	No Trend	19	19	30	0.03	0.675	8	8	30	0.324	0.174
CCR-AP-5	Radium-226 & 228	pCi/L	No Trend	Increasing	19	19	5.54	0.0501	0.363	8	8	5.54	0.683	0.00937
CCR-AP-6	Radium-226 & 228	pCi/L	No Trend	No Trend	19	19	10.2	0.0118	0.576	8	8	3.21	0.2	0.266
CCR-AP-7	Radium-226 & 228	pCi/L	Stable	Increasing	20	20	1.72	-0.0163	0.417	8	8	1.44	0.161	0.0187
CCR-AP-8	Radium-226 & 228	pCi/L	Stable	No Trend	18	18	2.88	-0.0145	0.544	8	8	2.88	0.0846	0.711
CCR-AP-9	Radium-226 & 228	pCi/L	Probably Increasing	No Trend	18	18	12.6	0.154	0.0956	8	8	12.6	0.583	0.386
CCR-AP-1R	Selenium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	22	10	0.025	NA	NA	8	5	0.0125	-0.0002	0.135
CCR-AP-2	Selenium, Total	mg/L	Increasing	No Trend	22	15	0.026	0.000171	0.0115	8	7	0.013	0.00035	0.386
CCR-AP-3	Selenium, Total	mg/L	Probably Increasing	No Trend	21	20	0.0068	1.79e-05	0.0752	8	8	0.003	1.25e-05	0.421
CCR-AP-4R	Selenium, Total	mg/L	Probably Increasing	No Trend	21	11	0.031	2.84e-05	0.0717	8	4	0.0036	0.000108	0.18
CCR-AP-5	Selenium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Increasing	21	7	0.025	NA	NA	8	6	0.02	0.0004	0.00609
CCR-AP-6	Selenium, Total	mg/L	No Trend	Stable	21	17	0.0125	9.55e-06	0.563	8	7	0.003	-0.000123	0.386
CCR-AP-7	Selenium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Only one detected result	21	3	0.0028	NA	NA	8	1	0.0028	NA	NA
CCR-AP-8	Selenium, Total	mg/L	No Trend	Stable	21	18	0.007	6.11e-06	0.693	8	8	0.0051	-0.00015	0.266
CCR-AP-9	Selenium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	20	6	0.025	NA	NA	8	2	0.025	NA	NA
CCR-AP-1R	Thallium, Total	mg/L	Increasing	No Trend	22	16	0.0027	3.13e-05	0.0187	8	5	0.0027	1.5e-05	0.618
CCR-AP-2	Thallium, Total	mg/L	Increasing	No Trend	22	19	0.0076	5.6e-05	6.75e-05	8	7	0.0076	0.000117	0.379
CCR-AP-3	Thallium, Total	mg/L	Not Evaluated - Only one detected result	Not Evaluated - No detected results	21	1	0.001	NA	NA	8	0	0.001	NA	NA
CCR-AP-4R	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	21	10	0.0025	NA	NA	8	2	0.001	NA	NA
CCR-AP-5	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	21	7	0.005	NA	NA	8	4	0.00096	1.5e-05	0.507
CCR-AP-6	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	21	8	0.0025	NA	NA	8	0	0.001	NA	NA
CCR-AP-7	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	23	4	0.001	NA	NA	8	0	0.001	NA	NA
CCR-AP-8	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	21	5	0.001	NA	NA	8	0	0.001	NA	NA
CCR-AP-9	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	20	9	0.005	NA	NA	8	0	0.005	NA	NA

Abbreviations: CF = confidence facotr; CV = coefficient of variation; mg/L = milligrams per liter; pCi/L = picocuries per liter.

Notes: *Recent data defined as the 8 most recent data points. MK = Mann Kendall Trend Test. Secular Trend Classification based on Aziz (2003) guidance and MK Results. Thiel-Sen slope and p-value evaluated at 95% confidence level to confirm MK trends.

Additional information about trend analysis provided in Attachment A.

ATTACHMENT A
Assessment Monitoring Statistical Analysis Summary – November 2023

Table A-1. Descriptive Statistics

Location	Constituent	Units	n	n, non-detects	percent of non-detects	max	min	mean	median	standard deviation	variance	reporting limit range	date range
CCR-AP-1R	Antimony, Total	mg/L	22	6	27	0.02000	0.00053	0.0036	0.0017	0.0057	3.2e-05	0.002 - 0.02	2016-06-10 to 2023-11-02
CCR-AP-2	Antimony, Total	mg/L	22	9	41	0.02000	0.00024	0.00357	0.002	0.0046	2.1e-05	0.002 - 0.02	2016-06-10 to 2023-11-02
CCR-AP-3	Antimony, Total	mg/L	21	16	76	0.00500	0.00031	0.00195	0.002	0.00087	7.6e-07	0.002 - 0.002	2016-06-10 to 2023-11-02
CCR-AP-4R	Antimony, Total	mg/L	21	14	67	0.02800	0.0004	0.00343	0.002	0.0059	3.5e-05	0.002 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-5	Antimony, Total	mg/L	21	15	71	0.02000	5.8e-05	0.00273	0.002	0.0041	1.6e-05	0.002 - 0.02	2016-06-10 to 2023-11-02
CCR-AP-6	Antimony, Total	mg/L	21	9	43	0.01800	0.00042	0.00254	0.0017	0.0041	1.7e-05	0.002 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-7	Antimony, Total	mg/L	23	20	87	0.00500	0.00016	0.00194	0.002	0.00084	7.1e-07	0.002 - 0.005	2016-06-10 to 2023-11-06
CCR-AP-8	Antimony, Total	mg/L	21	6	29	0.00460	0.0004	0.00135	0.0011	0.00097	9.5e-07	0.002 - 0.002	2017-03-09 to 2023-11-02
CCR-AP-9	Antimony, Total	mg/L	20	5	25	0.02000	0.00061	0.00437	0.0014	0.006	3.6e-05	0.002 - 0.02	2017-03-09 to 2023-05-23
CCR-AP-1R	Arsenic, Total	mg/L	22	0	0	0.03800	0.0024	0.0166	0.0135	0.011	0.00013	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Arsenic, Total	mg/L	22	0	0	0.04800	0.0016	0.0155	0.013	0.013	0.00016	NA	2016-06-10 to 2023-11-02
CCR-AP-3	Arsenic, Total	mg/L	21	0	0	0.09500	0.058	0.0765	0.077	0.0087	7.6e-05	NA	2016-06-10 to 2023-11-02
CCR-AP-4R	Arsenic, Total	mg/L	21	0	0	0.33000	0.027	0.115	0.086	0.081	0.0065	NA	2016-06-10 to 2023-11-02
CCR-AP-5	Arsenic, Total	mg/L	20	2	10	0.02400	0.00039	0.00458	0.00105	0.0073	5.3e-05	0.001 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-6	Arsenic, Total	mg/L	21	0	0	0.12000	0.04	0.0943	0.1	0.022	0.00046	NA	2016-06-10 to 2023-11-02
CCR-AP-7	Arsenic, Total	mg/L	23	0	0	0.01800	0.00066	0.00588	0.0055	0.0041	1.7e-05	NA	2016-06-10 to 2023-11-06
CCR-AP-8	Arsenic, Total	mg/L	21	0	0	0.12000	0.044	0.0898	0.095	0.022	0.00048	NA	2017-03-09 to 2023-11-02
CCR-AP-9	Arsenic, Total	mg/L	20	0	0	0.03200	0.0031	0.0104	0.00875	0.0063	4e-05	NA	2017-03-09 to 2023-05-23
CCR-AP-1R	Barium, Total	mg/L	22	0	0	0.59000	0.05	0.228	0.18	0.16	0.024	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Barium, Total	mg/L	22	0	0	0.64000	0.038	0.25	0.235	0.17	0.029	NA	2016-06-10 to 2023-11-02
CCR-AP-3	Barium, Total	mg/L	21	0	0	0.49000	0.38	0.431	0.43	0.032	0.001	NA	2016-06-10 to 2023-11-02
CCR-AP-4R	Barium, Total	mg/L	21	0	0	1.40000	0.45	0.703	0.63	0.25	0.061	NA	2016-06-10 to 2023-11-02
CCR-AP-5	Barium, Total	mg/L	21	0	0	0.20000	0.029	0.062	0.041	0.045	0.002	NA	2016-06-10 to 2023-11-02
CCR-AP-6	Barium, Total	mg/L	21	0	0	0.69000	0.48	0.582	0.58	0.066	0.0044	NA	2016-06-10 to 2023-11-02
CCR-AP-7	Barium, Total	mg/L	23	0	0	0.19000	0.076	0.128	0.12	0.029	0.00083	NA	2016-06-10 to 2023-11-06
CCR-AP-8	Barium, Total	mg/L	21	0	0	0.68000	0.31	0.543	0.57	0.096	0.0091	NA	2017-03-09 to 2023-11-02
CCR-AP-9	Barium, Total	mg/L	20	0	0	0.72000	0.13	0.293	0.27	0.12	0.015	NA	2017-03-09 to 2023-05-23
CCR-AP-1R	Beryllium, Total	mg/L	22	0	0	0.00660	0.00011	0.0027	0.0021	0.0022	4.7e-06	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Beryllium, Total	mg/L	22	0	0	0.00770	0.00014	0.0021	0.0018	0.0021	4.2e-06	NA	2016-06-10 to 2023-11-02
CCR-AP-3	Beryllium, Total	mg/L	21	20	95	0.00100	0.00056	0.000979	0.001	9.6e-05	9.2e-09	0.001 - 0.001	2016-06-10 to 2023-11-02
CCR-AP-4R	Beryllium, Total	mg/L	21	6	29	0.00170	0.00014	0.000693	0.00061	0.00044	1.9e-07	0.001 - 0.001	2016-06-10 to 2023-11-02
CCR-AP-5	Beryllium, Total	mg/L	21	15	71	0.01000	0.00017	0.00133	0.001	0.002	4e-06	0.001 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-6	Beryllium, Total	mg/L	21	8	38	0.00500	0.00011	0.000796	0.0005	0.001	1e-06	0.0005 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-7	Beryllium, Total	mg/L	23	16	70	0.00100	6.7e-05	0.00075	0.001	0.00037	1.4e-07	0.0005 - 0.001	2016-06-10 to 2023-11-06
CCR-AP-8	Beryllium, Total	mg/L	21	15	71	0.00100	0.00016	0.000763	0.001	0.00035	1.2e-07	0.0005 - 0.001	2017-03-09 to 2023-11-02
CCR-AP-9	Beryllium, Total	mg/L	20	1	5	0.01000	0.00017	0.00146	0.00091	0.0022	4.7e-06	0.01 - 0.01	2017-03-09 to 2023-05-23
CCR-AP-1R	Cadmium, Total	mg/L	22	12	55	0.01000	8.1e-05	0.00207	0.001	0.003	9e-06	0.001 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-2	Cadmium, Total	mg/L	22	3	14	0.01000	0.00011	0.00197	0.000875	0.0025	6.2e-06	0.005 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-3	Cadmium, Total	mg/L	21	20	95	0.00100	0.00038	0.00097	0.001	0.00014	1.8e-08	0.001 - 0.001	2016-06-10 to 2023-11-02
CCR-AP-4R	Cadmium, Total	mg/L	21	11	52	0.00500	0.00014	0.000883	0.001	0.001	1e-06	0.001 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-5	Cadmium, Total	mg/L	21	5	24	0.01000	0.00015	0.00106	0.00057	0.0021	4.3e-06	0.001 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-6	Cadmium, Total	mg/L	21	8	38	0.00110	9.4e-05	0.000621	0.00052	0.00037	1.4e-07	0.001 - 0.001	2016-06-10 to 2023-11-02
CCR-AP-7	Cadmium, Total	mg/L	23	21	91	0.00100	0.00014	0.000911	0.001	0.00024	5.8e-08	0.0005 - 0.001	2016-06-10 to 2023-11-06
CCR-AP-8	Cadmium, Total	mg/L	21	15	71	0.00100	0.00016	0.000796	0.001	0.00034	1.2e-07	0.001 - 0.001	2017-03-09 to 2023-11-02
CCR-AP-9	Cadmium, Total	mg/L	20	9	45	0.01000	7.9e-05	0.00184	0.00031	0.0031	9.9e-06	0.001 - 0.01	2017-03-09 to 2023-05-23
CCR-AP-1R	Chromium, Total	mg/L	22	0	0	0.16000	0.0019	0.0573	0.0455	0.047	0.0022	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Chromium, Total	mg/L	22	0	0	0.14000	0.003	0.0414	0.034	0.035	0.0012	NA	2016-06-10 to 2023-11-02
CCR-AP-3	Chromium, Total	mg/L	21	4	19	0.01400	0.0018	0.00297	0.0021	0.0026	6.8e-06	0.002 - 0.002	2016-06-10 to 2023-11-02
CCR-AP-4R	Chromium, Total	mg/L	20	2	10	0.05800	0.0015	0.013	0.00785	0.015	0.00022	0.002 - 0.0034	2016-06-10 to 2023-11-02
CCR-AP-5	Chromium, Total	mg/L	21	16	76	0.05600	0.0014	0.00694	0.002	0.013	0.00017	0.002 - 0.02	2016-06-10 to 2023-11-02
CCR-AP-6	Chromium, Total	mg/L	21	1	5	0.04300	0.0019	0.0133	0.0098	0.011	0.00012	0.002 - 0.002	2016-06-10 to 2023-11-02
CCR-AP-7	Chromium, Total	mg/L	23	11	48	0.01900	0.00047	0.00385	0.002	0.004	1.6e-05	0.002 - 0.01	2016-06-10 to 2023-11-06
CCR-AP-8	Chromium, Total	mg/L	20	2	10	0.01400	0.0012	0.00432	0.0029	0.0035	1.2e-05	0.002 - 0.0034	2017-03-09 to 2023-11-02
CCR-AP-9	Chromium, Total	mg/L	20	0	0	0.15000	0.0042	0.0262	0.017	0.032	0.00099	NA	2017-03-09 to 2023-05-23
CCR-AP-1R	Cobalt, Total	mg/L	22	0	0	0.08100	0.0015	0.0318	0.027	0.026	0.00067	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Cobalt, Total	mg/L	22	0	0	0.09100	0.0073	0.0277	0.022	0.02	0.00039	NA	2016-06-10 to 2023-11-02
CCR-AP-3	Cobalt, Total	mg/L	21	0	0	0.00940	0.004	0.00602	0.0056	0.0016	2.5e-06	NA	2016-06-10 to 2023-11-02
CCR-AP-4R	Cobalt, Total	mg/L	21	0	0	0.02100	0.00071	0.00701	0.0055	0.0056	3.1e-05	NA	2016-06-10 to 2023-11-02
CCR-AP-5	Cobalt, Total	mg/L	21	0	0	0.01000	0.00036	0.00407	0.0041	0.0026	6.8e-06	NA	2016-06-10 to 2023-11-02
CCR-AP-6	Cobalt, Total	mg/L	21	0	0	0.01900	0.0034	0.00879	0.0075	0.0044	1.9e-05	NA	2016-06-10 to 2023-11-02
CCR-AP-7	Cobalt, Total	mg/L	23	2	9	0.01500	0.00021	0.00226	0.001	0.0032	1e-05	0.0005 - 0.002	2016-06-10 to 2023-11-06
CCR-AP-8	Cobalt, Total	mg/L	21	0	0	0.01700	0.0026	0.00876	0.0082	0.0038	1.5e-05	NA	2017-03-09 to 2023-11-02
CCR-AP-9	Cobalt, Total	mg/L	20	0	0	0.04700	0.0062	0.0152	0.014	0.0085	7.2e-05	NA	2017-03-09 to 2023-05-23
CCR-AP-1R	Fluoride	mg/L	22	0	0	0.81000	0.34	0.506	0.485	0.096	0.0091	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Fluoride	mg/L	22	0	0	0.69000	0.11	0.366	0.31	0.15	0.023	NA	2016-06-10 to 2023-11-02
CCR-AP-3	Fluoride	mg/L	21	1	5	0.93000	0.1	0.404	0.39	0.19	0.036	0.1 - 0.1	2016-06-10 to 2023-11-02
CCR-AP-4R	Fluoride	mg/L	21	1	5	0.64000	0.1	0.379	0.37	0.11	0.012	0.1 - 0.1	2016-06-10 to 2023-11-02
CCR-AP-5	Fluoride	mg/L	21	0	0	2.30000	0.58	1.29	1.2	0.45	0.2	NA	2016-06-10 to 2023-11-02
CCR-AP-6	Fluoride	mg/L	21	0	0	0.69000	0.24	0.496	0.48	0.13	0.017	NA	2016-06-10 to 2023-11-02
CCR-AP-7	Fluoride	mg/L	22	0	0	0.72000	0.14	0.334	0.295	0.13	0.018	NA	2016-08-12 to 2023-11-06
CCR-AP-8	Fluoride	mg/L	21	1	5	1.10000	0.1	0.326	0.28	0.21	0.043	0.1 - 0.1	2017-03-09 to 2023-11-02
CCR-AP-9	Fluoride	mg/L	20	0	0	0.42000	0.14	0.33	0.345	0.065	0.0043	NA	2017-03-09 to 2023-05-23
CCR-AP-1R	Lead, Total	mg/L	22	0	0	0.09400	0.0011	0.0348	0.028	0.028	0.0008	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Lead, Total	mg/L	22	0	0	0.10000	0.0023	0.028	0.0225	0.025	0.00061	NA	2016-06-10 to 2023-11-02

Note:

Units: mg/L = milligrams per liter, pCi/L = picocuries per liter

Location	Constituent	Units	n	n, non-detects	percent of non-detects	max	min	mean	median	standard deviation	variance	reporting limit range	date range
CCR-AP-3	Lead, Total	mg/L	21	4	19	0.01000	0.00021	0.00122	0.00078	0.002	4.2e-06	0.001 - 0.001	2016-06-10 to 2023-11-02
CCR-AP-4R	Lead, Total	mg/L	21	0	0	0.04700	0.00052	0.0105	0.0048	0.013	0.00016	NA	2016-06-10 to 2023-11-02
CCR-AP-5	Lead, Total	mg/L	21	13	62	0.02000	9.9e-05	0.00262	0.001	0.0047	2.2e-05	0.001 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-6	Lead, Total	mg/L	21	0	0	0.04100	0.00039	0.00993	0.0071	0.0096	9.2e-05	NA	2016-06-10 to 2023-11-02
CCR-AP-7	Lead, Total	mg/L	23	9	39	0.02000	0.00013	0.00299	0.001	0.0044	1.9e-05	0.001 - 0.003	2016-06-10 to 2023-11-06
CCR-AP-8	Lead, Total	mg/L	21	1	5	0.00760	0.00027	0.00218	0.0017	0.0018	3.3e-06	0.003 - 0.003	2017-03-09 to 2023-11-02
CCR-AP-9	Lead, Total	mg/L	20	0	0	0.04100	0.0025	0.0128	0.0105	0.0089	7.9e-05	NA	2017-03-09 to 2023-05-23
CCR-AP-1R	Lithium, Total	mg/L	22	0	0	0.23000	0.035	0.094	0.0805	0.054	0.0029	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Lithium, Total	mg/L	22	5	23	0.25000	0.01	0.0514	0.0395	0.051	0.0026	0.05 - 0.25	2016-06-10 to 2023-11-02
CCR-AP-3	Lithium, Total	mg/L	21	18	86	0.05000	0.0021	0.0241	0.005	0.023	0.00053	0.005 - 0.05	2016-06-10 to 2023-11-02
CCR-AP-4R	Lithium, Total	mg/L	21	6	29	0.05000	0.0028	0.0212	0.011	0.019	0.00037	0.005 - 0.05	2016-06-10 to 2023-11-02
CCR-AP-5	Lithium, Total	mg/L	21	0	0	0.15000	0.009	0.093	0.095	0.042	0.0018	NA	2016-06-10 to 2023-11-02
CCR-AP-6	Lithium, Total	mg/L	21	11	52	0.25000	0.0014	0.034	0.014	0.053	0.0029	0.005 - 0.25	2016-06-10 to 2023-11-02
CCR-AP-7	Lithium, Total	mg/L	23	0	0	0.03900	0.007	0.0135	0.011	0.0068	4.7e-05	NA	2016-06-10 to 2023-11-06
CCR-AP-8	Lithium, Total	mg/L	21	16	76	0.05000	0.0031	0.023	0.008	0.022	0.00048	0.005 - 0.05	2017-03-09 to 2023-11-02
CCR-AP-9	Lithium, Total	mg/L	20	0	0	0.12000	0.029	0.0478	0.0405	0.02	0.00042	NA	2017-03-09 to 2023-05-23
CCR-AP-1R	Mercury, Total	mg/L	21	21	100	0.00200	0.0002	0.000314	0.0002	0.0004	1.6e-07	0.0002 - 0.002	2016-06-10 to 2023-11-02
CCR-AP-2	Mercury, Total	mg/L	21	13	62	0.00071	0.00015	0.000243	0.0002	0.00013	1.6e-08	0.0002 - 0.0002	2016-06-10 to 2023-11-02
CCR-AP-3	Mercury, Total	mg/L	20	20	100	0.00050	0.0002	0.000215	0.0002	6.7e-05	4.5e-09	0.0002 - 0.0005	2016-06-10 to 2023-11-02
CCR-AP-4R	Mercury, Total	mg/L	20	20	100	0.00050	0.0002	0.000225	0.0002	7.9e-05	6.2e-09	0.0002 - 0.0005	2016-06-10 to 2023-11-02
CCR-AP-5	Mercury, Total	mg/L	20	17	85	0.00160	0.0002	0.000311	0.0002	0.00034	1.2e-07	0.0002 - 0.0002	2016-06-10 to 2023-11-02
CCR-AP-6	Mercury, Total	mg/L	20	18	90	0.00050	0.00017	0.000224	0.0002	8.1e-05	6.5e-09	0.0002 - 0.0005	2016-06-10 to 2023-11-02
CCR-AP-7	Mercury, Total	mg/L	20	20	100	0.00050	0.0002	0.000215	0.0002	6.7e-05	4.5e-09	0.0002 - 0.0005	2016-06-10 to 2023-11-06
CCR-AP-8	Mercury, Total	mg/L	20	19	95	0.00050	0.0002	0.000218	0.0002	6.8e-05	4.6e-09	0.0002 - 0.0005	2017-03-09 to 2023-11-02
CCR-AP-9	Mercury, Total	mg/L	19	19	100	0.00020	0.0002	0.0002	0.0002	0	0	0.0002 - 0.0002	2017-03-09 to 2023-05-23
CCR-AP-1R	Molybdenum, Total	mg/L	22	0	0	0.02300	0.0047	0.00945	0.0086	0.004	1.6e-05	NA	2016-06-10 to 2023-11-02
CCR-AP-2	Molybdenum, Total	mg/L	22	0	0	0.01000	0.00094	0.0047	0.0047	0.0027	7.5e-06	NA	2016-06-10 to 2023-11-02
CCR-AP-3	Molybdenum, Total	mg/L	21	0	0	0.02500	0.0065	0.0112	0.01	0.0039	1.5e-05	NA	2016-06-10 to 2023-11-02
CCR-AP-4R	Molybdenum, Total	mg/L	21	3	14	0.01000	0.00071	0.00318	0.0022	0.0026	6.9e-06	0.005 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-5	Molybdenum, Total	mg/L	21	0	0	0.53000	0.046	0.294	0.33	0.12	0.014	NA	2016-06-10 to 2023-11-02
CCR-AP-6	Molybdenum, Total	mg/L	21	0	0	0.03700	0.015	0.0248	0.024	0.0056	3.2e-05	NA	2016-06-10 to 2023-11-02
CCR-AP-7	Molybdenum, Total	mg/L	23	1	4	0.01300	0.0011	0.00377	0.0025	0.0031	9.3e-06	0.005 - 0.005	2016-06-10 to 2023-11-06
CCR-AP-8	Molybdenum, Total	mg/L	21	0	0	0.02900	0.0029	0.0145	0.014	0.0055	3e-05	NA	2017-03-09 to 2023-11-02
CCR-AP-9	Molybdenum, Total	mg/L	20	2	10	0.05000	0.0018	0.00779	0.00495	0.01	0.00011	0.005 - 0.05	2017-03-09 to 2023-05-23
CCR-AP-1R	Radium-226 & 228	pCi/L	20	0	0	14.40000	0.862	4.75	4.58	3.3	11	NA	2016-06-10 to 2023-12-22
CCR-AP-2	Radium-226 & 228	pCi/L	20	1	5	5.53000	0.444	2.07	1.79	1.4	2.1	0.444 - 0.444	2016-06-10 to 2023-11-02
CCR-AP-3	Radium-226 & 228	pCi/L	19	1	5	4.87000	0.593	1.79	1.7	1.2	1.3	2.98 - 2.98	2016-06-10 to 2023-11-02
CCR-AP-4R	Radium-226 & 228	pCi/L	19	0	0	30.00000	1.07	3.9	2.4	6.4	41	NA	2016-06-10 to 2023-11-02
CCR-AP-5	Radium-226 & 228	pCi/L	19	0	0	5.54000	0.292	1.25	0.64	1.4	1.9	NA	2016-06-10 to 2023-11-02
CCR-AP-6	Radium-226 & 228	pCi/L	19	0	0	10.20000	0.351	2.47	1.68	2.2	4.9	NA	2016-06-10 to 2023-11-02
CCR-AP-7	Radium-226 & 228	pCi/L	20	0	0	1.72000	0.126	0.847	0.716	0.46	0.21	NA	2016-06-10 to 2023-11-06
CCR-AP-8	Radium-226 & 228	pCi/L	18	0	0	2.88000	0.449	1.46	1.48	0.66	0.43	NA	2017-03-09 to 2023-11-02
CCR-AP-9	Radium-226 & 228	pCi/L	18	0	0	12.60000	0.934	3.56	2.87	2.9	8.5	NA	2017-03-09 to 2023-05-23
CCR-AP-1R	Selenium, Total	mg/L	22	12	55	0.05000	0.00045	0.0114	0.005	0.015	0.00023	0.005 - 0.05	2016-06-10 to 2023-11-02
CCR-AP-2	Selenium, Total	mg/L	22	7	32	0.05000	0.00044	0.00882	0.005	0.012	0.00013	0.005 - 0.05	2016-06-10 to 2023-11-02
CCR-AP-3	Selenium, Total	mg/L	21	1	5	0.00680	0.00062	0.00223	0.0019	0.0013	1.7e-06	0.005 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-4R	Selenium, Total	mg/L	21	10	48	0.03100	0.0009	0.00468	0.005	0.0063	3.9e-05	0.005 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-5	Selenium, Total	mg/L	21	14	67	0.05000	0.0018	0.0076	0.005	0.01	0.00011	0.005 - 0.05	2016-06-10 to 2023-11-02
CCR-AP-6	Selenium, Total	mg/L	21	4	19	0.02500	0.001	0.00345	0.0019	0.0051	2.6e-05	0.005 - 0.025	2016-06-10 to 2023-11-02
CCR-AP-7	Selenium, Total	mg/L	21	18	86	0.00500	0.00035	0.00447	0.005	0.0014	1.9e-06	0.005 - 0.005	2016-06-10 to 2023-11-06
CCR-AP-8	Selenium, Total	mg/L	21	3	14	0.00700	0.0014	0.00271	0.0019	0.0016	2.7e-06	0.005 - 0.005	2017-03-09 to 2023-11-02
CCR-AP-9	Selenium, Total	mg/L	20	14	70	0.05000	0.001	0.0089	0.005	0.012	0.00014	0.005 - 0.05	2017-03-09 to 2023-05-23
CCR-AP-1R	Thallium, Total	mg/L	22	6	27	0.00500	7.9e-05	0.00102	0.0009	0.0011	1.2e-06	0.001 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-2	Thallium, Total	mg/L	22	3	14	0.00760	4.8e-05	0.00117	0.000825	0.0018	3.1e-06	0.001 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-3	Thallium, Total	mg/L	21	20	95	0.00200	0.0001	0.001	0.001	0.0003	9e-08	0.001 - 0.002	2016-06-10 to 2023-11-02
CCR-AP-4R	Thallium, Total	mg/L	21	11	52	0.00500	6.1e-05	0.000847	0.001	0.0011	1.2e-06	0.001 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-5	Thallium, Total	mg/L	21	14	67	0.01000	6.5e-05	0.00119	0.001	0.0021	4.2e-06	0.001 - 0.01	2016-06-10 to 2023-11-02
CCR-AP-6	Thallium, Total	mg/L	21	13	62	0.00500	4.7e-05	0.000906	0.001	0.0011	1.1e-06	0.001 - 0.005	2016-06-10 to 2023-11-02
CCR-AP-7	Thallium, Total	mg/L	23	19	83	0.00200	6.6e-05	0.000906	0.001	0.0004	1.6e-07	0.001 - 0.002	2016-06-10 to 2023-11-06
CCR-AP-8	Thallium, Total	mg/L	21	16	76	0.00200	5.8e-05	0.00084	0.001	0.00046	2.1e-07	0.001 - 0.002	2017-03-09 to 2023-11-02
CCR-AP-9	Thallium, Total	mg/L	20	11	55	0.01000	9.8e-05	0.00133	0.001	0.0023	5.3e-06	0.001 - 0.01	2017-03-09 to 2023-05-23

Note:

Units: mg/L = milligrams per liter, pCi/L = picocuries per liter

Table A-2. Results of Shapiro-Wilk Test for Normality

				Shapiro-Wilk Test for Normality (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit)				Shapiro-Wilk Test for Lognormality on select datasets (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit, datasets log transformed)			
Location	Constituent	n	n, non-detects	W statistic	p-value	Data Normality (significance level = 0.05)	Data Normality (significance level = 0.01)	W statistic	p-value	Data Normality (significance level = 0.05)	Data Normality (significance level = 0.01)
CCR-AP-1R	Antimony, Total	22	6	0.6372	3.43e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-2	Antimony, Total	22	9	0.7025	2.11e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-3	Antimony, Total	21	16	0.4273	4.64e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Antimony, Total	21	14	0.3258	7.13e-09	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Antimony, Total	21	15	0.4615	9.16e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Antimony, Total	21	9	0.368	1.52e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Antimony, Total	23	20	0.4792	5.46e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Antimony, Total	21	6	0.5705	9.75e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Antimony, Total	20	5	0.7053	4.53e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Arsenic, Total	22	0	0.9073	0.0417	Not normal	Normal	NA	NA	NA	NA
CCR-AP-2	Arsenic, Total	22	0	0.8965	0.02527	Not normal	Normal	NA	NA	NA	NA
CCR-AP-3	Arsenic, Total	21	0	0.983	0.9612	Normal	Normal	NA	NA	NA	NA
CCR-AP-4R	Arsenic, Total	21	0	0.7996	0.0006464	Not normal	Not normal	0.9723	0.7831	Lognormal	Lognormal
CCR-AP-5	Arsenic, Total	20	2	0.5848	2.06e-06	Not normal	Not normal	0.8687	0.01113	Not normal	Lognormal
CCR-AP-6	Arsenic, Total	21	0	0.8715	0.01018	Not normal	Normal	NA	NA	NA	NA
CCR-AP-7	Arsenic, Total	23	0	0.8686	0.006032	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Arsenic, Total	21	0	0.9448	0.2712	Normal	Normal	NA	NA	NA	NA
CCR-AP-9	Arsenic, Total	20	0	0.7489	0.000164	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Barium, Total	22	0	0.8819	0.01312	Not normal	Normal	NA	NA	NA	NA
CCR-AP-2	Barium, Total	22	0	0.9119	0.05174	Normal	Normal	NA	NA	NA	NA
CCR-AP-3	Barium, Total	21	0	0.9521	0.3731	Normal	Normal	NA	NA	NA	NA
CCR-AP-4R	Barium, Total	21	0	0.7672	0.0002157	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Barium, Total	21	0	0.7223	5.29e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Barium, Total	21	0	0.9457	0.282	Normal	Normal	NA	NA	NA	NA
CCR-AP-7	Barium, Total	23	0	0.9567	0.3997	Normal	Normal	NA	NA	NA	NA
CCR-AP-8	Barium, Total	21	0	0.9349	0.1722	Normal	Normal	NA	NA	NA	NA
CCR-AP-9	Barium, Total	20	0	0.7778	0.00041	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Beryllium, Total	22	0	0.89	0.01882	Not normal	Normal	NA	NA	NA	NA
CCR-AP-2	Beryllium, Total	22	0	0.786	0.0003046	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-3	Beryllium, Total	21	20	0.2284	1.4e-09	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Beryllium, Total	21	6	0.8028	0.0007251	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Beryllium, Total	21	15	0.3958	2.54e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Beryllium, Total	21	8	0.5847	1.36e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Beryllium, Total	23	16	0.7676	0.0001213	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Beryllium, Total	21	15	0.6685	1.14e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Beryllium, Total	20	1	0.667	1.59e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Cadmium, Total	22	12	0.6371	3.42e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-2	Cadmium, Total	22	3	0.7407	6.75e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-3	Cadmium, Total	21	20	0.2284	1.4e-09	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Cadmium, Total	21	11	0.5419	5.07e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Cadmium, Total	21	5	0.4804	1.35e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Cadmium, Total	21	8	0.8228	0.001493	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Cadmium, Total	23	21	0.4204	1.62e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Cadmium, Total	21	15	0.6751	1.37e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Cadmium, Total	20	9	0.5945	2.58e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Chromium, Total	22	0	0.8994	0.02887	Not normal	Normal	NA	NA	NA	NA
CCR-AP-2	Chromium, Total	22	0	0.8946	0.0232	Not normal	Normal	NA	NA	NA	NA
CCR-AP-3	Chromium, Total	21	4	0.5135	2.71e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Chromium, Total	20	2	0.7581	0.0002188	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Chromium, Total	21	16	0.4313	5.02e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Chromium, Total	21	1	0.8563	0.005455	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Chromium, Total	23	11	0.5967	8.3e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Chromium, Total	20	2	0.7875	0.0005657	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Chromium, Total	20	0	0.5688	1.42e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Cobalt, Total	22	0	0.8809	0.01255	Not normal	Normal	NA	NA	NA	NA
CCR-AP-2	Cobalt, Total	22	0	0.7759	0.000215	Not normal	Not normal	0.9796	0.909	Lognormal	Lognormal
CCR-AP-3	Cobalt, Total	21	0	0.9188	0.08221	Normal	Normal	NA	NA	NA	NA
CCR-AP-4R	Cobalt, Total	21	0	0.8624	0.007	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Cobalt, Total	21	0	0.9529	0.3867	Normal	Normal	NA	NA	NA	NA

				Shapiro-Wilk Test for Normality (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit)				Shapiro-Wilk Test for Lognormality on select datasets (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit, datasets log transformed)			
Location	**Constituent**	**n**	**n, non-detects**	**W statistic**	**p-value**	**Data Normality (significance level = 0.05)**	**Data Normality (significance level = 0.01)**	**W statistic**	**p-value**	**Data Normality (significance level = 0.05)**	**Data Normality (significance level = 0.01)**
CCR-AP-6	Cobalt, Total	21	0	0.912	0.06001	Normal	Normal	NA	NA	NA	NA
CCR-AP-7	Cobalt, Total	23	2	0.6111	1.2e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Cobalt, Total	21	0	0.9659	0.6413	Normal	Normal	NA	NA	NA	NA
CCR-AP-9	Cobalt, Total	20	0	0.6873	2.74e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Fluoride	44	0	0.8774	0.0002353	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-2	Fluoride	44	0	0.9309	0.01121	Not normal	Normal	NA	NA	NA	NA
CCR-AP-3	Fluoride	42	2	0.9362	0.02117	Not normal	Normal	NA	NA	NA	NA
CCR-AP-4R	Fluoride	42	2	0.9349	0.0191	Not normal	Normal	NA	NA	NA	NA
CCR-AP-5	Fluoride	42	0	0.8864	0.0005783	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Fluoride	42	0	0.9448	0.04207	Not normal	Normal	NA	NA	NA	NA
CCR-AP-7	Fluoride	44	0	0.8676	0.0001266	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Fluoride	42	2	0.7346	2.33e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Fluoride	40	0	0.8556	0.0001233	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Lead, Total	22	0	0.8984	0.02756	Not normal	Normal	NA	NA	NA	NA
CCR-AP-2	Lead, Total	22	0	0.8718	0.008464	Not normal	Not normal	0.944	0.2388	Lognormal	Lognormal
CCR-AP-3	Lead, Total	21	4	0.3724	1.65e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Lead, Total	21	0	0.7147	4.23e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Lead, Total	21	13	0.4576	8.46e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Lead, Total	21	0	0.8002	0.0006598	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Lead, Total	23	9	0.5867	6.47e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Lead, Total	21	1	0.7841	0.0003785	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Lead, Total	20	0	0.8278	0.002312	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Lithium, Total	22	0	0.9014	0.03172	Not normal	Normal	NA	NA	NA	NA
CCR-AP-2	Lithium, Total	22	5	0.7974	0.0004551	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-3	Lithium, Total	21	18	0.6543	7.82e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Lithium, Total	21	6	0.8691	0.009226	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Lithium, Total	21	0	0.9559	0.4379	Normal	Normal	NA	NA	NA	NA
CCR-AP-6	Lithium, Total	21	11	0.5462	5.58e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Lithium, Total	23	0	0.6987	1.35e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Lithium, Total	21	16	0.7165	4.45e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Lithium, Total	20	0	0.7294	9.11e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Mercury, Total	21	21	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results	NA	NA	NA	NA
CCR-AP-2	Mercury, Total	21	13	0.603	2.12e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-3	Mercury, Total	20	20	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results	NA	NA	NA	NA
CCR-AP-4R	Mercury, Total	20	20	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results	NA	NA	NA	NA
CCR-AP-5	Mercury, Total	20	17	0.3998	4.45e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Mercury, Total	20	18	0.4141	5.81e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Mercury, Total	20	20	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results	NA	NA	NA	NA
CCR-AP-8	Mercury, Total	20	19	0.3551	1.98e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Mercury, Total	19	19	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results	NA	NA	NA	NA
CCR-AP-1R	Molybdenum, Total	22	0	0.8283	0.001438	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-2	Molybdenum, Total	22	0	0.9395	0.1932	Normal	Normal	NA	NA	NA	NA
CCR-AP-3	Molybdenum, Total	21	0	0.7939	0.0005304	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Molybdenum, Total	21	3	0.6974	2.56e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Molybdenum, Total	21	0	0.9467	0.2945	Normal	Normal	0.8362	0 002481	Not normal	Not normal
CCR-AP-6	Molybdenum, Total	21	0	0.9694	0.7203	Normal	Normal	NA	NA	NA	NA
CCR-AP-7	Molybdenum, Total	23	1	0.773	0.0001462	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Molybdenum, Total	21	0	0.9174	0.0771	Normal	Normal	NA	NA	NA	NA
CCR-AP-9	Molybdenum, Total	20	2	0.7168	6.3e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Radium-226 & 228	38	0	0.9063	0.003864	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Radium-226 & 228	2	0	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results	NA	NA	NA	NA
CCR-AP-2	Radium-226 & 228	40	2	0.8682	0.0002567	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-3	Radium-226 & 228	38	2	0.81	1.68e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Radium-226 & 228	38	0	0.3859	1.94e-11	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Radium-226 & 228	38	0	0.6799	7.95e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Radium-226 & 228	38	0	0.6464	2.51e-08	Not normal	Not normal	NA	NA	NA	NA

Location	Constituent	n	n, non-detects	Shapiro-Wilk Test for Normality (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit) W statistic	p-value	Data Normality (significance level = 0.05)	Data Normality (significance level = 0.01)	Shapiro-Wilk Test for Lognormality on select datasets (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit, datasets log transformed) W statistic	p-value	Data Normality (significance level = 0.05)	Data Normality (significance level = 0.01)
CCR-AP-7	Radium-226 & 228	40	0	0.9303	0.01645	Not normal	Normal	NA	NA	NA	NA
CCR-AP-8	Radium-226 & 228	36	0	0.9631	0.2682	Normal	Normal	NA	NA	NA	NA
CCR-AP-9	Radium-226 & 228	36	0	0.7516	2.03e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Selenium, Total	22	12	0.6681	7.89e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-2	Selenium, Total	22	7	0.7224	3.82e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-3	Selenium, Total	21	1	0.5491	5.96e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Selenium, Total	21	10	0.3121	5.63e-09	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Selenium, Total	21	14	0.4836	1.44e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Selenium, Total	21	4	0.5151	2.81e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Selenium, Total	21	18	0.4041	2.97e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Selenium, Total	21	3	0.631	4.26e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Selenium, Total	20	14	0.6214	4.95e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-1R	Thallium, Total	22	6	0.8126	0.0007934	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-2	Thallium, Total	22	3	0.5215	2.11e-07	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-3	Thallium, Total	21	20	0.4303	4.92e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-4R	Thallium, Total	21	11	0.6065	2.31e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-5	Thallium, Total	21	14	0.3788	1.85e-08	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-6	Thallium, Total	21	13	0.6003	1.99e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-7	Thallium, Total	23	19	0.6225	1.61e-06	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-8	Thallium, Total	21	16	0.7117	3.87e-05	Not normal	Not normal	NA	NA	NA	NA
CCR-AP-9	Thallium, Total	20	11	0.5154	4.39e-07	Not normal	Not normal	NA	NA	NA	NA

Table A-3. Results of Rosner/Dixon Test for Outliers

				Rosner or Dixon Test for Outliers (R programming, package = outliers, version 0.15, function = dixon.test or rosnerTest, non-detects substituted by 0.5*reporting limit)					
Location	Chemical	n	n_nd	Outlier Test	Statistic.Out	P.value.Out	Alternative	Statistical.Outlier	Outlier Removed
CCR-AP-1R	Antimony, Total	22	6	Dixon	0.5302	0.01366	highest value 0.01 is an outlier	Yes	No
CCR-AP-2	Antimony, Total	22	9	Dixon	0.5476	0.007539	highest value 0.01 is an outlier	Yes	No
CCR-AP-3	Antimony, Total	21	16	Dixon	0.9662	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-4R	Antimony, Total	21	14	Dixon	0.9134	0	highest value 0.028 is an outlier	Yes	No
CCR-AP-5	Antimony, Total	21	15	Dixon	0.8111	0	highest value 0.01 is an outlier	Yes	No
CCR-AP-6	Antimony, Total	21	9	Dixon	0.9304	0	highest value 0.018 is an outlier	Yes	No
CCR-AP-7	Antimony, Total	23	20	Dixon	0.8982	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-8	Antimony, Total	21	6	Dixon	0.7729	0	highest value 0.0046 is an outlier	Yes	No
CCR-AP-9	Antimony, Total	20	5	Dixon	0.2278	0.9895	highest value 0.01 is an outlier	No	NA
CCR-AP-1R	Arsenic, Total	22	0	Dixon	0.1194	0.4192	highest value 0.038 is an outlier	No	NA
CCR-AP-2	Arsenic, Total	22	0	Dixon	0.3463	0.3107	highest value 0.048 is an outlier	No	NA
CCR-AP-3	Arsenic, Total	21	0	Dixon	0.3214	0.4391	lowest value 0.058 is an outlier	No	NA
CCR-AP-4R	Arsenic, Total	21	0	Dixon	0.4912	0.03981	highest value 0.33 is an outlier	Yes	No
CCR-AP-5	Arsenic, Total	20	2	Dixon	0.6319	0	highest value 0.024 is an outlier	Yes	No
CCR-AP-6	Arsenic, Total	21	0	Dixon	0.2857	0.6068	lowest value 0.04 is an outlier	No	NA
CCR-AP-7	Arsenic, Total	23	0	Dixon	0.5926	0	highest value 0.018 is an outlier	Yes	No
CCR-AP-8	Arsenic, Total	21	0	Dixon	0.2424	0.8592	lowest value 0.044 is an outlier	No	NA
CCR-AP-9	Arsenic, Total	20	0	Dixon	0.6489	0	highest value 0.032 is an outlier	Yes	No
CCR-AP-1R	Barium, Total	22	0	Dixon	0.2358	0.8565	highest value 0.59 is an outlier	No	NA
CCR-AP-2	Barium, Total	22	0	Dixon	0.2051	0.9493	highest value 0.64 is an outlier	No	NA
CCR-AP-3	Barium, Total	21	0	Dixon	0.1111	0.3494	highest value 0.49 is an outlier	No	NA
CCR-AP-4R	Barium, Total	21	0	Dixon	0.5455	0.01186	highest value 1.4 is an outlier	Yes	No
CCR-AP-5	Barium, Total	21	0	Dixon	0.4762	0.05385	highest value 0.2 is an outlier	No	NA
CCR-AP-6	Barium, Total	21	0	Dixon	0	0	highest value 0.69 is an outlier	Yes	No
CCR-AP-7	Barium, Total	23	0	Dixon	0.3333	0.3311	highest value 0.19 is an outlier	No	NA
CCR-AP-8	Barium, Total	21	0	Dixon	0.3529	0.3171	lowest value 0.31 is an outlier	No	NA
CCR-AP-9	Barium, Total	20	0	Dixon	0.6471	0	highest value 0.72 is an outlier	Yes	No
CCR-AP-1R	Beryllium, Total	22	0	Dixon	0.1637	0.6843	highest value 0.0066 is an outlier	No	NA
CCR-AP-2	Beryllium, Total	22	0	Dixon	0.3794	0.2069	highest value 0.0077 is an outlier	No	NA
CCR-AP-3	Beryllium, Total	21	20	Dixon	1	0	highest value 0 00056 is an outlier	Yes	No
CCR-AP-4R	Beryllium, Total	21	6	Dixon	0.3922	0.1971	highest value 0.0017 is an outlier	No	NA
CCR-AP-5	Beryllium, Total	21	15	Dixon	0.8918	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-6	Beryllium, Total	21	8	Dixon	0.7974	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-7	Beryllium, Total	23	16	Dixon	0.1917	0.8982	lowest value 0.000067 is an outlier	No	NA
CCR-AP-8	Beryllium, Total	21	15	Dixon	0.1765	0.7338	lowest value 0 00016 is an outlier	No	NA
CCR-AP-9	Beryllium, Total	20	1	Dixon	0.7064	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-1R	Cadmium, Total	22	12	Dixon	0.523	0.01631	highest value 0.005 is an outlier	Yes	No
CCR-AP-2	Cadmium, Total	22	3	Dixon	0.6592	0	highest value 0.0066 is an outlier	Yes	No
CCR-AP-3	Cadmium, Total	21	20	Dixon	1	0	lowest value 0.00038 is an outlier	Yes	No
CCR-AP-4R	Cadmium, Total	21	11	Dixon	0.7716	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-5	Cadmium, Total	21	5	Dixon	0.7851	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-6	Cadmium, Total	21	8	Dixon	0.6304	0	highest value 0.0011 is an outlier	Yes	No
CCR-AP-7	Cadmium, Total	23	21	Dixon	0.5	0.02229	lowest value 0.00014 is an outlier	Yes	No
CCR-AP-8	Cadmium, Total	21	15	Dixon	0.08824	0 229	lowest value 0.00016 is an outlier	No	NA
CCR-AP-9	Cadmium, Total	20	9	Dixon	0.5112	0.03283	highest value 0.005 is an outlier	Yes	No
CCR-AP-1R	Chromium, Total	22	0	Dixon	0.2667	0.6731	highest value 0.16 is an outlier	No	NA
CCR-AP-2	Chromium, Total	22	0	Dixon	0.4255	0.1073	highest value 0.14 is an outlier	No	NA
CCR-AP-3	Chromium, Total	21	4	Dixon	0.7615	0	highest value 0.014 is an outlier	Yes	No
CCR-AP-4R	Chromium, Total	20	2	Dixon	0.5329	0.02096	highest value 0.058 is an outlier	Yes	No
CCR-AP-5	Chromium, Total	21	16	Dixon	0.8364	0	highest value 0.056 is an outlier	Yes	No
CCR-AP-6	Chromium, Total	21	1	Dixon	0.3509	0.3244	highest value 0.043 is an outlier	No	NA
CCR-AP-7	Chromium, Total	23	11	Dixon	0.7167	0	highest value 0.019 is an outlier	Yes	No
CCR-AP-8	Chromium, Total	20	2	Dixon	0.5635	0.009447	highest value 0.014 is an outlier	Yes	No
CCR-AP-9	Chromium, Total	20	0	Dixon	0.7436	0	highest value 0.15 is an outlier	Yes	No
CCR-AP-1R	Cobalt, Total	22	0	Dixon	0.07989	0.2086	highest value 0.081 is an outlier	No	NA
CCR-AP-2	Cobalt, Total	22	0	Dixon	0.6375	0	highest value 0.091 is an outlier	Yes	No
CCR-AP-3	Cobalt, Total	21	0	Dixon	0.28	0.6377	highest value 0.0094 is an outlier	No	NA
CCR-AP-4R	Cobalt, Total	21	0	Dixon	0.4145	0.1459	highest value 0.021 is an outlier	No	NA
CCR-AP-5	Cobalt, Total	21	0	Dixon	0.327	0.4161	highest value 0.01 is an outlier	No	NA
CCR-AP-6	Cobalt, Total	21	0	Dixon	0.3378	0.3734	highest value 0.019 is an outlier	No	NA
CCR-AP-7	Cobalt, Total	23	2	Dixon	0.6594	0	highest value 0.015 is an outlier	Yes	No
CCR-AP-8	Cobalt, Total	21	0	Dixon	0.3623	0 285	highest value 0.017 is an outlier	No	NA
CCR-AP-9	Cobalt, Total	20	0	Dixon	0.7179	0	highest value 0.047 is an outlier	Yes	No
CCR-AP-1R	Fluoride	22	0	Dixon	0.561	0.002602	highest value 0.81 is an outlier	Yes	No

Rosner or Dixon Test for Outliers (R programming, package = outliers, version 0.15, function = dixon.test or rosnerTest, non-detects substituted by 0.5*reporting limit)

Location	Chemical	n	n_nd	Outlier Test	Statistic.Out	P.value.Out	Alternative	Statistical.Outlier	Outlier Removed
CCR-AP-2	Fluoride	22	0	Dixon	0.3043	0.4808	highest value 0.69 is an outlier	No	NA
CCR-AP-3	Fluoride	21	1	Dixon	0.5	0.03305	highest value 0.93 is an outlier	Yes	No
CCR-AP-4R	Fluoride	21	1	Dixon	0.5455	0.01186	lowest value 0.05 is an outlier	Yes	No
CCR-AP-5	Fluoride	21	0	Dixon	0.2158	0.9746	highest value 2.3 is an outlier	No	NA
CCR-AP-6	Fluoride	21	0	Dixon	0.2791	0.6428	lowest value 0.24 is an outlier	No	NA
CCR-AP-7	Fluoride	22	0	Dixon	0.46	0.06051	highest value 0.72 is an outlier	No	NA
CCR-AP-8	Fluoride	21	1	Dixon	0.7473	0	highest value 1.1 is an outlier	Yes	No
CCR-AP-9	Fluoride	20	0	Dixon	0.48	0.06152	lowest value 0.14 is an outlier	No	NA
CCR-AP-1R	Lead, Total	22	0	Dixon	0.2064	0.9577	highest value 0.094 is an outlier	No	NA
CCR-AP-2	Lead, Total	22	0	Dixon	0.5041	0.02474	highest value 0.1 is an outlier	Yes	No
CCR-AP-3	Lead, Total	21	4	Dixon	0.8912	0	highest value 0.01 is an outlier	Yes	No
CCR-AP-4R	Lead, Total	21	0	Dixon	0.5752	0.001029	highest value 0.047 is an outlier	Yes	No
CCR-AP-5	Lead, Total	21	13	Dixon	0.7572	0	highest value 0.02 is an outlier	Yes	No
CCR-AP-6	Lead, Total	21	0	Dixon	0.5398	0.0138	highest value 0.041 is an outlier	Yes	No
CCR-AP-7	Lead, Total	23	9	Dixon	0.6051	0	highest value 0.02 is an outlier	Yes	No
CCR-AP-8	Lead, Total	21	1	Dixon	0.6125	0	highest value 0.0076 is an outlier	Yes	No
CCR-AP-9	Lead, Total	20	0	Dixon	0.4802	0.06127	highest value 0.041 is an outlier	No	NA
CCR-AP-1R	Lithium, Total	22	0	Dixon	0.3608	0.2619	highest value 0.23 is an outlier	No	NA
CCR-AP-2	Lithium, Total	22	5	Dixon	0.3889	0.1825	highest value 0.125 is an outlier	No	NA
CCR-AP-3	Lithium, Total	21	18	Dixon	0	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-4R	Lithium, Total	21	6	Dixon	0.4989	0.03386	highest value 0.047 is an outlier	Yes	No
CCR-AP-5	Lithium, Total	21	0	Dixon	0.1844	0.7837	lowest value 0.009 is an outlier	No	NA
CCR-AP-6	Lithium, Total	21	11	Dixon	0.8163	0	highest value 0.125 is an outlier	Yes	No
CCR-AP-7	Lithium, Total	23	0	Dixon	0.6355	0	highest value 0.039 is an outlier	Yes	No
CCR-AP-8	Lithium, Total	21	16	Dixon	0	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-9	Lithium, Total	20	0	Dixon	0.6437	0	highest value 0.12 is an outlier	Yes	No
CCR-AP-1R	Mercury, Total	21	21	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-2	Mercury, Total	21	13	Dixon	0.541	0.0134	highest value 0 00071 is an outlier	Yes	No
CCR-AP-3	Mercury, Total	20	20	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-4R	Mercury, Total	20	20	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-5	Mercury, Total	20	17	Dixon	0.8533	0	highest value 0.0016 is an outlier	Yes	No
CCR-AP-6	Mercury, Total	20	18	Dixon	0.7742	0	highest value 0 00041 is an outlier	Yes	No
CCR-AP-7	Mercury, Total	20	20	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-8	Mercury, Total	20	19	Dixon	1	0	highest value 0 00026 is an outlier	Yes	No
CCR-AP-9	Mercury, Total	19	19	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-1R	Molybdenum, Total	22	0	Dixon	0.5882	0	highest value 0.023 is an outlier	Yes	No
CCR-AP-2	Molybdenum, Total	22	0	Dixon	0.2558	0.7355	highest value 0.01 is an outlier	No	NA
CCR-AP-3	Molybdenum, Total	21	0	Dixon	0.6145	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-4R	Molybdenum, Total	21	3	Dixon	0.5954	0	highest value 0.01 is an outlier	Yes	No
CCR-AP-5	Molybdenum, Total	21	0	Dixon	0.2733	0.6752	lowest value 0.046 is an outlier	No	NA
CCR-AP-6	Molybdenum, Total	21	0	Dixon	0.2105	0.9425	highest value 0.037 is an outlier	No	NA
CCR-AP-7	Molybdenum, Total	23	1	Dixon	0.4138	0.1122	highest value 0.013 is an outlier	No	NA
CCR-AP-8	Molybdenum, Total	21	0	Dixon	0.4712	0.05917	highest value 0.029 is an outlier	No	NA
CCR-AP-9	Molybdenum, Total	20	2	Dixon	0.6278	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-1R	Radium-226 & 228	20	0	Dixon	0.5301	0.02225	highest value 14.4 is an outlier	Yes	No
CCR-AP-2	Radium-226 & 228	20	1	Dixon	0.47	0.07269	highest value 5.53 is an outlier	No	NA
CCR-AP-3	Radium-226 & 228	19	1	Dixon	0.5436	0.02151	highest value 4.87 is an outlier	Yes	No
CCR-AP-4R	Radium-226 & 228	19	0	Dixon	0.8959	0	highest value 30 is an outlier	Yes	No
CCR-AP-5	Radium-226 & 228	19	0	Dixon	0.5277	0.03011	highest value 5.54 is an outlier	Yes	No
CCR-AP-6	Radium-226 & 228	19	0	Dixon	0.7767	0	highest value 10.2 is an outlier	Yes	No
CCR-AP-7	Radium-226 & 228	20	0	Dixon	0.2152	0 935	highest value 1.72 is an outlier	No	NA
CCR-AP-8	Radium-226 & 228	18	0	Dixon	0.3621	0.3958	highest value 2.88 is an outlier	No	NA
CCR-AP-9	Radium-226 & 228	18	0	Dixon	0.58	0.01299	highest value 12.6 is an outlier	Yes	No
CCR-AP-1R	Selenium, Total	22	12	Dixon	0	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-2	Selenium, Total	22	7	Dixon	0.4049	0.1462	highest value 0.026 is an outlier	No	NA
CCR-AP-3	Selenium, Total	21	1	Dixon	0.8269	0	highest value 0.0068 is an outlier	Yes	No
CCR-AP-4R	Selenium, Total	21	10	Dixon	0.9532	0	highest value 0.031 is an outlier	Yes	No
CCR-AP-5	Selenium, Total	21	14	Dixon	0.7867	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-6	Selenium, Total	21	4	Dixon	0.8407	0	highest value 0.0125 is an outlier	Yes	No
CCR-AP-7	Selenium, Total	21	18	Dixon	1	0	lowest value 0 00035 is an outlier	Yes	No
CCR-AP-8	Selenium, Total	21	3	Dixon	0.6909	0	highest value 0.007 is an outlier	Yes	No
CCR-AP-9	Selenium, Total	20	14	Dixon	0.5297	0.02246	highest value 0.025 is an outlier	Yes	No
CCR-AP-1R	Thallium, Total	22	6	Dixon	0.4977	0.02832	highest value 0.0027 is an outlier	Yes	No
CCR-AP-2	Thallium, Total	22	3	Dixon	0.8445	0	highest value 0.0076 is an outlier	Yes	No
CCR-AP-3	Thallium, Total	21	20	Dixon	1	0	highest value 0.001 is an outlier	Yes	No
CCR-AP-4R	Thallium, Total	21	11	Dixon	0.8207	0	highest value 0.0025 is an outlier	Yes	No

Rosner or Dixon Test for Outliers (R programming, package = outliers, version 0.15, function = dixon.test or rosnerTest, non-detects substituted by 0.5*reporting limit)

Location	Chemical	n	n_nd	Outlier Test	Statistic.Out	P.value.Out	Alternative	Statistical.Outlier	Outlier Removed
CCR-AP-5	Thallium, Total	21	14	Dixon	0.9298	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-6	Thallium, Total	21	13	Dixon	0.8299	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-7	Thallium, Total	23	19	Dixon	0.5482	0.003983	highest value 0.001 is an outlier	Yes	No
CCR-AP-8	Thallium, Total	21	16	Dixon	0.5453	0.01192	highest value 0.001 is an outlier	Yes	No
CCR-AP-9	Thallium, Total	20	11	Dixon	0.8221	0	highest value 0.005 is an outlier	Yes	No

Table A-4. Results of Mann Kendall and Thiel Sen Trend Tests

		Mann Kendall Trends			Secular Trend Evaluation for All Data									Secular Trend Evaluation for Recent Data (subset of 8 most recent data points)								
					Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)		Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)	
Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
CCR-AP-1R	Antimony, Total	No Trend	Stable	No	22	16	1.18	0.133	0.41	59	30	0.0000192	0.41	8	8	2020-11-13 to 2023-11-02	0.658	-0.182	0.618	38.2	-5	-0.000088	0.618
CCR-AP-2	Antimony, Total	No Trend	No Trend	No	22	13	1.05	0.239	0.138	86.2	53	0.00002	0.138	8	8	2020-11-12 to 2023-11-02	1.01	0.327	0.319	68.1	9	0.000105	0.319
CCR-AP-3	Antimony, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	21	5	0.783	NA	NA	NA	NA	NA	NA	8	3	2020-05-20 to 2023-11-02	0.878	NA	NA	NA	NA	NA	NA
CCR-AP-4R	Antimony, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	21	7	2.3	NA	NA	NA	NA	NA	NA	8	5	2020-05-20 to 2023-11-02	1.99	0.189	0.61	39	5	0.000188	0.61
CCR-AP-5	Antimony, Total	Not Evaluated - Majority of data (>50%) non-detect.	Probably Increasing	No	21	6	1.34	NA	NA	NA	NA	NA	NA	8	5	2020-05-19 to 2023-11-02	0.916	0.567	0.0746	92.5	15	0.000172	0.0746
CCR-AP-6	Antimony, Total	No Trend	No Trend	No	21	12	1.99	0.0837	0.636	36.4	16	0	0.636	8	6	2020-05-20 to 2023-11-02	2	0.34	0.308	69.2	9	0.000134	0.308
CCR-AP-7	Antimony, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Only one detected result.	No	23	3	0.375	NA	NA	NA	NA	NA	NA	8	1	2020-05-18 to 2023-11-06	0.465	NA	NA	NA	NA	NA	NA
CCR-AP-8	Antimony, Total	Stable	No Trend	No	21	15	0.826	-0.217	0.195	80.5	-43	-0.0000177	0.195	8	7	2020-05-20 to 2023-11-02	1.15	0.0714	0.902	9 8	2	0.0000211	0.902
CCR-AP-9	Antimony, Total	No Trend	No Trend	No	20	15	1.07	0	1	0	0	0	1	8	6	2019-10-22 to 2023-05-23	1	-0.214	0.536	46.4	-6	-0.000162	0.536
CCR-AP-1R	Arsenic, Total	Increasing	Stable	No	22	22	0.69	0.422	0.00675	99.3	97	0.000708	0.00675	8	8	2020-11-13 to 2023-11-02	0.45	-0.143	0.711	28.9	-4	-0 001	0.711
CCR-AP-2	Arsenic, Total	Increasing	Probably Increasing	No	22	22	0.828	0.616	0.0000769	100	141	0.00145	0.0000769	8	8	2020-11-12 to 2023-11-02	0.604	0.571	0.0635	93.7	16	0.005	0.0635
CCR-AP-3	Arsenic, Total	Increasing	Stable	No	21	21	0.114	0.402	0.0136	98.6	82	0.000818	0.0136	8	8	2020-05-20 to 2023-11-02	0.0802	-0.0378	1	0	-1	0	1
CCR-AP-4R	Arsenic, Total	Increasing	No Trend	No	21	21	0.7	0.538	0.000782	99.9	112	0.00618	0.000782	8	8	2020-05-20 to 2023-11-02	0.521	0.0714	0.902	9 8	2	0 00325	0.902
CCR-AP-5	Arsenic, Total	Increasing	Increasing	No	20	18	1.67	0.515	0.00181	99.8	97	0.000226	0.00181	8	8	2020-05-19 to 2023-11-02	1.05	0.909	0.00277	99.7	25	0 00204	0 00277
CCR-AP-6	Arsenic, Total	Increasing	Stable	No	21	21	0.228	0.419	0.0117	98.8	83	0.00206	0.0117	8	8	2020-05-20 to 2023-11-02	0.0759	-0.161	0.694	30.6	-4	0	0.694
CCR-AP-7	Arsenic, Total	Decreasing	Stable	No	23	23	0.701	-0.363	0.0173	98.3	-91	-0.000232	0.0173	8	8	2020-05-18 to 2023-11-06	0.972	-0.473	0.135	86.5	-13	-0.000733	0.135
CCR-AP-8	Arsenic, Total	Increasing	Stable	No	21	21	0.243	0.572	0.000422	100	117	0.00294	0.000422	8	8	2020-05-20 to 2023-11-02	0.169	-0.512	0.12	88	-13	-0.00333	0.12
CCR-AP-9	Arsenic, Total	No Trend	Stable	No	20	20	0.604	0.239	0.153	84.7	45	0.000226	0.153	8	8	2019-10-22 to 2023-05-23	0.415	-0.255	0.454	54.6	-7	-0.000633	0.454
CCR-AP-1R	Barium, Total	Increasing	Stable	No	22	22	0.684	0.312	0.0452	95.5	72	0.00842	0.0452	8	8	2020-11-13 to 2023-11-02	0.343	-0.0714	0.902	9 8	-2	-0.00667	0.902
CCR-AP-2	Barium, Total	Increasing	Increasing	No	22	22	0.678	0.436	0.00519	99.5	100	0.015	0.00519	8	8	2020-11-12 to 2023-11-02	0.617	0.714	0.0187	98.1	20	0.08	0.0187
CCR-AP-3	Barium, Total	No Trend	No Trend	No	21	21	0.0734	0.261	0.114	88.6	53	0.002	0.114	8	8	2020-05-20 to 2023-11-02	0.0765	0.0364	1	0	1	0 00167	1
CCR-AP-4R	Barium, Total	No Trend	No Trend	No	21	21	0.351	0.0823	0.628	37.2	17	0.00333	0.628	8	8	2020-05-20 to 2023-11-02	0.416	0.182	0.618	38.2	5	0.0317	0.618
CCR-AP-5	Barium, Total	Increasing	Probably Increasing	No	21	21	0.723	0.612	0.000124	100	128	0.00358	0.000124	8	8	2020-05-19 to 2023-11-02	0.558	0.571	0.0635	93.7	16	0.0161	0.0635
CCR-AP-6	Barium, Total	Stable	Decreasing	No	21	21	0.114	-0.161	0.332	66.8	-33	-0.00258	0.332	8	8	2020-05-20 to 2023-11-02	0.126	-0.618	0.0461	95.4	-17	-0 015	0.0461
CCR-AP-7	Barium, Total	Decreasing	Stable	No	23	23	0.224	-0.367	0.019	98.1	-89	-0.00222	0.019	8	8	2020-05-18 to 2023-11-06	0.302	-0.4	0.212	78.8	-11	-0.00625	0.212
CCR-AP-8	Barium, Total	Decreasing	Decreasing	No	21	21	0.176	-0.496	0.00202	99.8	-103	-0.01	0.00202	8	8	2020-05-20 to 2023-11-02	0.197	-0.618	0.0461	95.4	-17	-0 0317	0.0461
CCR-AP-9	Barium, Total	Increasing	Stable	No	20	20	0.416	0.344	0.04	96	64	0.00812	0.04	8	8	2019-10-22 to 2023-05-23	0.267	-0.0364	1	0	-1	-0.00167	1
CCR-AP-1R	Beryllium, Total	Increasing	Stable	No	22	22	0.804	0.42	0.00679	99.3	97	0.00018	0.00679	8	8	2020-11-13 to 2023-11-02	0.518	-0.143	0.711	28.9	-4	-0.000292	0.711
CCR-AP-2	Beryllium, Total	Increasing	No Trend	No	22	22	0.981	0.57	0.000244	100	131	0.00016	0.000244	8	8	2020-11-12 to 2023-11-02	0.736	0.286	0.386	61.4	8	0.000707	0.386
CCR-AP-3	Beryllium, Total	Not Evaluated - Only one detected result.	Not Evaluated - Only one detected result.	No	21	1	0.026	NA	NA	NA	NA	NA	NA	8	1	2020-05-20 to 2023-11-02	0.0418	NA	NA	NA	NA	NA	NA
CCR-AP-4R	Beryllium, Total	Increasing	Stable	No	21	15	0.713	0.44	0.0071	99.3	89	0.0000213	0.0071	8	4	2020-05-20 to 2023-11-02	0.62	-0.242	0.507	49.3	-6	-0.00000214	0.507
CCR-AP-5	Beryllium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Only one detected result.	No	21	6	1.33	NA	NA	NA	NA	NA	NA	8	1	2020-05-19 to 2023-11-02	0.61	NA	NA	NA	NA	NA	NA
CCR-AP-6	Beryllium, Total	No Trend	Not Evaluated - Majority of data (>50%) non-detect.	No	21	13	0.946	0.218	0.188	81.2	44	0.00000882	0.188	8	3	2020-05-20 to 2023-11-02	0.544	NA	NA	NA	NA	NA	NA
CCR-AP-7	Beryllium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Only one detected result.	No	23	7	0.415	NA	NA	NA	NA	NA	NA	8	1	2020-05-18 to 2023-11-06	0.253	NA	NA	NA	NA	NA	NA
CCR-AP-8	Beryllium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	21	6	0.302	NA	NA	NA	NA	NA	NA	8	2	2020-05-20 to 2023-11-02	0.295	NA	NA	NA	NA	NA	NA
CCR-AP-9	Beryllium, Total	Increasing	Stable	No	20	19	1.01	0.383	0.021	97.9	72	0.000046	0.021	8	7	2019-10-22 to 2023-05-23	0.898	-0.0714	0.902	9 8	-2	-0.0000325	0.902
CCR-AP-1R	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Decreasing	No	22	10	1.31	NA	NA	NA	NA	NA	NA	8	6	2020-11-13 to 2023-11-02	1.27	-0.643	0.0354	96.5	-18	-0.0000487	0.0354

Note:
Mann Kendall Trends are classified based on Aziz (2003) guidance.

		Mann Kendall Trends			Secular Trend Evaluation for All Data										Secular Trend Evaluation for Recent Data (subset of 8 most recent data points)								
					Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)		Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)								Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)	
Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
CCR-AP-2	Cadmium, Total	Increasing	No Trend	No	22	19	1.04	0.383	0.014	98.6	88	0.0000547	0.014	8	8	2020-11-12 to 2023-11-02	1.07	0.255	0.454	54.6	7	0.000164	0.454
CCR-AP-3	Cadmium, Total	Not Evaluated - Only one detected result.	Not Evaluated - Only one detected result.	No	21	1	0.053	NA	NA	NA	NA	NA	NA	8	1	2020-05-20 to 2023-11-02	0.0875	NA	NA	NA	NA	NA	NA
CCR-AP-4R	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Stable	No	21	10	0.922	NA	NA	NA	NA	NA	NA	8	4	2020-05-20 to 2023-11-02	0.309	0	1	0	0	0	1
CCR-AP-5	Cadmium, Total	No Trend	No Trend	No	21	16	1.41	0.0971	0.564	43.6	20	0.00000735	0.564	8	5	2020-05-19 to 2023-11-02	0.559	0.265	0.445	55.5	7	0.0000588	0.445
CCR-AP-6	Cadmium, Total	No Trend	Not Evaluated - Majority of data (>50%) non-detect.	No	21	13	0.499	0.178	0.298	70.2	34	0	0.298	8	2	2020-05-20 to 2023-11-02	0.52	NA	NA	NA	NA	NA	NA
CCR-AP-7	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	23	2	0.203	NA	NA	NA	NA	NA	NA	8	0	2020-05-18 to 2023-11-06	0.189	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	21	6	0.308	NA	NA	NA	NA	NA	NA	8	4	2020-05-20 to 2023-11-02	0.383	0.206	0.592	40.8	5	0	0.592
CCR-AP-9	Cadmium, Total	Increasing	Not Evaluated - Majority of data (>50%) non-detect.	No	20	11	1.6	0.492	0.00351	99.6	90	0.0000236	0.00351	8	2	2019-10-22 to 2023-05-23	1.33	NA	NA	NA	NA	NA	NA
CCR-AP-1R	Chromium, Total	Increasing	No Trend	No	22	22	0.826	0.378	0.0152	98.5	87	0.00312	0.0152	8	8	2020-11-13 to 2023-11-02	0.448	0.0714	0.902	9 8	2	0.0028	0.902
CCR-AP-2	Chromium, Total	Increasing	Increasing	No	22	22	0.85	0.558	0.000307	100	129	0.004	0.000307	8	8	2020-11-12 to 2023-11-02	0.709	0.714	0.0187	98.1	20	0.0163	0.0187
CCR-AP-3	Chromium, Total	No Trend	No Trend	No	21	17	0.979	0.24	0.15	85	48	0.0000361	0.15	8	7	2020-05-20 to 2023-11-02	1.11	0.182	0.618	38.2	5	0.000138	0.618
CCR-AP-4R	Chromium, Total	No Trend	No Trend	No	20	18	0.885	0.243	0.144	85.6	46	0.000386	0.144	8	7	2020-05-20 to 2023-11-02	0.858	0.0714	0.902	9 8	2	0.000317	0.902
CCR-AP-5	Chromium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Probably Increasing	No	21	5	2.27	NA	NA	NA	NA	NA	NA	8	4	2020-05-19 to 2023-11-02	1.63	0.564	0.0842	91.6	14	0 00236	0.0842
CCR-AP-6	Chromium, Total	Stable	No Trend	No	21	20	0.833	-0.101	0.545	45.5	-21	-0.000148	0.545	8	7	2020-05-20 to 2023-11-02	1.33	-0.214	0.536	46.4	-6	-0.00035	0.536
CCR-AP-7	Chromium, Total	No Trend	Not Evaluated - Only one detected result.	No	23	12	1.27	0.0422	0.808	19.2	10	0	0.808	8	1	2020-05-18 to 2023-11-06	0.805	NA	NA	NA	NA	NA	NA
CCR-AP-8	Chromium, Total	No Trend	No Trend	No	20	18	0.851	0.0212	0.922	7.8	4	0.00000972	0.922	8	7	2020-05-20 to 2023-11-02	1.01	-0.182	0.618	38.2	-5	-0.000287	0.618
CCR-AP-9	Chromium, Total	Increasing	No Trend	No	20	20	1.2	0.462	0.0052	99.5	87	0.00129	0.0052	8	8	2019-10-22 to 2023-05-23	0.491	0.109	0.803	19.7	3	0 00108	0.803
CCR-AP-1R	Cobalt, Total	Increasing	Stable	No	22	22	0.816	0.434	0.00523	99.5	100	0.00192	0.00523	8	8	2020-11-13 to 2023-11-02	0.561	-0.0714	0.902	9 8	-2	-0.000633	0.902
CCR-AP-2	Cobalt, Total	Increasing	Probably Increasing	No	22	22	0.717	0.627	0.0000541	100	144	0.00164	0.0000541	8	8	2020-11-12 to 2023-11-02	0.654	0.571	0.0635	93.7	16	0 00774	0.0635
CCR-AP-3	Cobalt, Total	Decreasing	No Trend	No	21	21	0.261	-0.581	0.000258	100	-122	-0.000195	0.000258	8	8	2020-05-20 to 2023-11-02	0.324	0.0714	0.902	9 8	2	0.0001	0.902
CCR-AP-4R	Cobalt, Total	No Trend	Stable	Yes	21	21	0.623	0.0334	0.856	14.4	7	0.0000144	0.856	8	8	2020-05-20 to 2023-11-02	0.671	-0.0714	0.902	9 8	-2	-0.000179	0.902
CCR-AP-5	Cobalt, Total	Decreasing	Increasing	No	21	21	0.639	-0.49	0.00225	99.8	-102	-0.000355	0.00225	8	8	2020-05-19 to 2023-11-02	1.22	0.618	0.0461	95.4	17	0.000712	0.0461
CCR-AP-6	Cobalt, Total	Stable	Stable	No	21	21	0.502	-0.181	0.264	73.6	-38	-0.000168	0.264	8	8	2020-05-20 to 2023-11-02	0.738	-0.143	0.711	28.9	-4	-0.000147	0.711
CCR-AP-7	Cobalt, Total	Decreasing	No Trend	No	23	21	1.47	-0.377	0.013	98.7	-95	-0.00009	0.013	8	6	2020-05-18 to 2023-11-06	1.4	0.0714	0.902	9 8	2	0.0000247	0.902
CCR-AP-8	Cobalt, Total	Decreasing	Stable	No	21	21	0.439	-0.586	0.000275	100	-121	-0.000475	0.000275	8	8	2020-05-20 to 2023-11-02	0.509	-0.214	0.536	46.4	-6	-0.000545	0.536
CCR-AP-9	Cobalt, Total	Increasing	Stable	No	20	20	0.556	0.368	0.0286	97.1	68	0.000341	0.0286	8	8	2019-10-22 to 2023-05-23	0.281	-0.0378	1	0	-1	0	1
CCR-AP-1R	Fluoride	Decreasing	Decreasing	No	22	22	0.189	-0.435	0.00594	99.4	-98	-0.00692	0.00594	8	8	2020-11-13 to 2023-11-02	0.163	-0.837	0.00609	99.4	-23	-0.02	0 00609
CCR-AP-2	Fluoride	Increasing	No Trend	No	22	22	0.415	0.586	0.000171	100	134	0.0167	0.000171	8	8	2020-11-12 to 2023-11-02	0.255	0.182	0.618	38.2	5	0.03	0.618
CCR-AP-3	Fluoride	Stable	Stable	No	21	20	0.482	-0.216	0.183	81.7	-45	-0.0105	0.183	8	8	2020-05-20 to 2023-11-02	0.402	-0.357	0.266	73.4	-10	-0 0179	0.266
CCR-AP-4R	Fluoride	No Trend	No Trend	No	21	20	0.314	0.158	0.333	66.7	33	0.005	0.333	8	8	2020-05-20 to 2023-11-02	0.279	0.0714	0.902	9 8	2	0.0117	0.902
CCR-AP-5	Fluoride	Increasing	No Trend	No	21	21	0.349	0.544	0.000765	99.9	112	0.05	0.000765	8	8	2020-05-19 to 2023-11-02	0.312	0.371	0.258	74.2	10	0.139	0.258
CCR-AP-6	Fluoride	Stable	No Trend	No	21	21	0.263	-0.067	0.694	30.6	-14	-0.00375	0.694	8	8	2020-05-20 to 2023-11-02	0.303	0.0714	0.902	9 8	2	0.009	0.902
CCR-AP-7	Fluoride	Increasing	No Trend	No	22	22	0.397	0.368	0.019	98.1	84	0.00875	0.019	8	8	2020-05-18 to 2023-11-06	0.333	0.182	0.618	38.2	5	0.0267	0.618
CCR-AP-8	Fluoride	No Trend	No Trend	No	21	20	0.648	0.192	0.238	76.2	40	0.00764	0.238	8	8	2020-05-20 to 2023-11-02	0.757	0.327	0.319	68.1	9	0.0333	0.319
CCR-AP-9	Fluoride	No Trend	No Trend	No	20	20	0.198	0.14	0.415	58.5	26	0.00172	0.415	8	8	2019-10-22 to 2023-05-23	0.199	0.182	0.618	38.2	5	0.0045	0.618
CCR-AP-1R	Lead, Total	Increasing	Stable	No	22	22	0.815	0.429	0.00572	99.4	99	0.00194	0.00572	8	8	2020-11-13 to 2023-11-02	0.541	0	1	0	0	0 00025	1
CCR-AP-2	Lead, Total	Increasing	Increasing	No	22	22	0.883	0.566	0.000271	100	130	0.0025	0.000271	8	8	2020-11-12 to 2023-11-02	0.736	0.643	0.0354	96.5	18	0.0101	0.0354
CCR-AP-3	Lead, Total	Increasing	No Trend	No	21	17	1.85	0.348	0.0314	96.9	72	0.0000223	0.0314	8	7	2020-05-20 to 2023-11-02	1.61	0.214	0.536	46.4	6	0.000132	0.536
CCR-AP-4R	Lead, Total	No Trend	Stable	Yes	21	21	0.908	0.173	0.29	71	36	0.000167	0.29	8	8	2020-05-20 to 2023-11-02	0.856	-0.0714	0.902	9 8	-2	-0.00045	0.902

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Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
CCR-AP-5	Lead, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	21	8	2.17	NA	NA	NA	NA	NA	NA	8	6	2020-05-19 to 2023-11-02	1.7	0.4	0.212	78.8	11	0.000821	0.212
CCR-AP-6	Lead, Total	Stable	No Trend	No	21	21	0.966	-0.0525	0.763	23.7	-11	-0.0000822	0.763	8	8	2020-05-20 to 2023-11-02	1.6	0	1	0	0	-0.00004	1
CCR-AP-7	Lead, Total	Probably Decreasing	Not Evaluated - Majority of data (>50%) non-detect.	No	23	14	1.64	-0.265	0.0935	90.6	-63	-0.0000336	0.0935	8	3	2020-05-18 to 2023-11-06	1.48	NA	NA	NA	NA	NA	NA
CCR-AP-8	Lead, Total	No Trend	Stable	No	21	20	0.855	0.144	0.38	62	30	0.0000333	0.38	8	7	2020-05-20 to 2023-11-02	0.876	-0.143	0.711	28.9	-4	-0.000133	0.711
CCR-AP-9	Lead, Total	Increasing	Stable	No	20	20	0.695	0.387	0.0193	98.1	73	0.000571	0.0193	8	8	2019-10-22 to 2023-05-23	0.412	-0.109	0.803	19.7	-3	-0.000425	0.803
CCR-AP-1R	Lithium, Total	Increasing	No Trend	No	22	22	0.571	0.385	0.0139	98.6	88	0.004	0.0139	8	8	2020-11-13 to 2023-11-02	0.31	0.182	0.618	38.2	5	0.0049	0.618
CCR-AP-2	Lithium, Total	Probably Increasing	Increasing	No	22	17	0.757	0.308	0.0508	94.9	70	0.0016	0.0508	8	8	2020-11-12 to 2023-11-02	0.733	0.714	0.0187	98.1	20	0.0132	0.0187
CCR-AP-3	Lithium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	21	3	0.923	NA	NA	NA	NA	NA	NA	8	3	2020-05-20 to 2023-11-02	0.262	NA	NA	NA	NA	NA	NA
CCR-AP-4R	Lithium, Total	Stable	No Trend	No	21	15	0.75	-0.149	0.375	62.5	-30	-0.000219	0.375	8	7	2020-05-20 to 2023-11-02	0.852	0.214	0.536	46.4	6	0.000538	0.536
CCR-AP-5	Lithium, Total	Decreasing	No Trend	No	21	21	0.452	-0.699	0.000013	100	-145	-0.00563	0.000013	8	8	2020-05-19 to 2023-11-02	0.466	0.214	0.536	46.4	6	0 00214	0.536
CCR-AP-6	Lithium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	21	10	1.35	NA	NA	NA	NA	NA	NA	8	5	2020-05-20 to 2023-11-02	1.09	-0.255	0.454	54.6	-7	-0.000182	0.454
CCR-AP-7	Lithium, Total	Decreasing	Stable	No	23	23	0.508	-0.427	0.006	99.4	-104	-0.000211	0.006	8	8	2020-05-18 to 2023-11-06	0.336	-0.143	0.711	28.9	-4	-0.00045	0.711
CCR-AP-8	Lithium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Only one detected result.	No	21	5	0.854	NA	NA	NA	NA	NA	NA	8	1	2020-05-20 to 2023-11-02	0.468	NA	NA	NA	NA	NA	NA
CCR-AP-9	Lithium, Total	Increasing	Stable	No	20	20	0.427	0.351	0.0345	96.5	66	0.000858	0.0345	8	8	2019-10-22 to 2023-05-23	0.262	-0.143	0.711	28.9	-4	-0.00217	0.711
CCR-AP-1R	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	21	0	1.26	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2020-11-13 to 2023-11-02	1.24	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-2	Mercury, Total	Not Evaluated - Majority of data (>50%) non-detect.	Increasing	No	21	8	0.862	NA	NA	NA	NA	NA	NA	8	6	2020-11-12 to 2023-11-02	0.798	0.667	0.0327	96.7	18	0.000048	0.0327
CCR-AP-3	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	20	0	0.312	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2020-05-20 to 2023-11-02	0.447	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-4R	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	20	0	0.35	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2020-05-20 to 2023-11-02	0.447	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-5	Mercury, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	20	3	1.64	NA	NA	NA	NA	NA	NA	8	3	2020-05-19 to 2023-11-02	1.33	NA	NA	NA	NA	NA	NA
CCR-AP-6	Mercury, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	20	2	0.6	NA	NA	NA	NA	NA	NA	8	2	2020-05-20 to 2023-11-02	0.676	NA	NA	NA	NA	NA	NA
CCR-AP-7	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	20	0	0.312	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2020-05-18 to 2023-11-06	0.447	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Mercury, Total	Not Evaluated - Only one detected result.	Not Evaluated - Only one detected result.	No	20	1	0.413	NA	NA	NA	NA	NA	NA	8	1	2020-05-20 to 2023-11-02	0.517	NA	NA	NA	NA	NA	NA
CCR-AP-9	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	19	0	0	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2019-10-22 to 2023-05-23	0	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-1R	Molybdenum, Total	Stable	Stable	No	22	22	0.426	-0.053	0.755	24.5	-12	-0.000025	0.755	8	8	2020-11-13 to 2023-11-02	0.577	-0.4	0.212	78.8	-11	-0.000264	0.212
CCR-AP-2	Molybdenum, Total	Increasing	No Trend	No	22	22	0.584	0.662	0.00002	100	152	0.000358	0.0000201	8	8	2020-11-12 to 2023-11-02	0.307	0.5	0.108	89.2	14	0.000533	0.108
CCR-AP-3	Molybdenum, Total	Decreasing	No Trend	No	21	21	0.349	-0.438	0.0074	99.3	-89	-0.0003	0.0074	8	8	2020-05-20 to 2023-11-02	0.563	0.109	0.803	19.7	3	0.000213	0.803
CCR-AP-4R	Molybdenum, Total	Increasing	No Trend	No	21	18	0.892	0.35	0.0312	96.9	72	0.000113	0.0312	8	5	2020-05-20 to 2023-11-02	0.794	0.189	0.61	39	5	0 00025	0.61
CCR-AP-5	Molybdenum, Total	Decreasing	Stable	No	21	21	0.405	-0.488	0.00266	99.7	-100	-0.0121	0.00266	8	8	2020-05-19 to 2023-11-02	0.471	-0.222	0 53	47	-6	-0 015	0.53
CCR-AP-6	Molybdenum, Total	Stable	Stable	No	21	21	0.226	-0.0586	0.738	26.2	-12	-0.0000774	0.738	8	8	2020-05-20 to 2023-11-02	0.285	-0.255	0.454	54.6	-7	-0.0005	0.454
CCR-AP-7	Molybdenum, Total	Decreasing	No Trend	No	23	22	0.833	-0.652	0.000018	100	-163	-0.00025	0.000018	8	7	2020-05-18 to 2023-11-06	0.259	0.109	0.803	19.7	3	0.0000732	0.803
CCR-AP-8	Molybdenum, Total	Stable	Stable	No	21	21	0.377	-0.0248	0.903	9.7	-5	0	0.903	8	8	2020-05-20 to 2023-11-02	0.503	-0.0364	1	0	-1	-0.0000833	1

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					Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)		Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)	
Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
CCR-AP-9	Molybdenum, Total	Decreasing	No Trend	No	20	18	0.812	-0.47	0.00428	99.6	-89	-0.000292	0.00428	8	6	2019-10-22 to 2023-05-23	1.3	-0.286	0.386	61.4	-8	-0.00025	0.386
CCR-AP-1R	Radium-226 & 228	No Trend	No Trend	No	20	20	0.7	0.2	0.23	77	38	0.0993	0.23	8	8	2020-05-19 to 2023-12-22	0.766	0.357	0.266	73.4	10	1.6	0.266
CCR-AP-2	Radium-226 & 228	No Trend	No Trend	No	20	19	0.71	0.0105	0.974	2.6	2	0.00427	0.974	8	7	2020-05-20 to 2023-11-02	0.821	0.143	0.711	28.9	4	0.252	0.711
CCR-AP-3	Radium-226 & 228	No Trend	No Trend	No	19	18	0.652	0.00585	1	0	1	0.0048	1	8	7	2020-05-20 to 2023-11-02	0.781	0.286	0.386	61.4	8	0.189	0.386
CCR-AP-4R	Radium-226 & 228	No Trend	No Trend	No	19	19	1.65	0.076	0.675	32.5	13	0.03	0.675	8	8	2020-05-20 to 2023-11-02	1.66	0.429	0.174	82.6	12	0.324	0.174
CCR-AP-5	Radium-226 & 228	No Trend	Increasing	No	19	19	1.1	0.158	0.363	63.7	27	0.0501	0.363	8	8	2020-05-19 to 2023-11-02	0.9	0.786	0.00937	99.1	22	0.683	0 00937
CCR-AP-6	Radium-226 & 228	No Trend	No Trend	No	19	19	0.893	0.0994	0.576	42.4	17	0.0118	0.576	8	8	2020-05-20 to 2023-11-02	0.509	0.357	0.266	73.4	10	0.2	0.266
CCR-AP-7	Radium-226 & 228	Stable	Increasing	No	20	20	0.547	-0.137	0.417	58.3	-26	-0.0163	0.417	8	8	2020-05-18 to 2023-11-06	0.676	0.714	0.0187	98.1	20	0.161	0.0187
CCR-AP-8	Radium-226 & 228	Stable	No Trend	No	18	18	0.451	-0.111	0.544	45.6	-17	-0.0145	0.544	8	8	2020-05-20 to 2023-11-02	0.477	0.143	0.711	28.9	4	0 0846	0.711
CCR-AP-9	Radium-226 & 228	Probably Increasing	No Trend	No	18	18	0.821	0.294	0.0956	90.4	45	0.154	0.0956	8	8	2019-10-22 to 2023-05-23	0.779	0.286	0.386	61.4	8	0.583	0.386
CCR-AP-1R	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	22	10	1.26	NA	NA	NA	NA	NA	NA	8	5	2020-11-13 to 2023-11-02	1.01	-0.473	0.135	86.5	-13	-0.0002	0.135
CCR-AP-2	Selenium, Total	Increasing	No Trend	No	22	15	1.13	0.399	0.0115	98.9	90	0.000171	0.0115	8	7	2020-11-12 to 2023-11-02	0.772	0.286	0.386	61.4	8	0 00035	0.386
CCR-AP-3	Selenium, Total	Probably Increasing	No Trend	No	21	20	0.549	0.296	0.0752	92.5	59	0.0000179	0.0752	8	8	2020-05-20 to 2023-11-02	0.209	0.289	0.421	57.9	7	0.0000125	0.421
CCR-AP-4R	Selenium, Total	Probably Increasing	No Trend	No	21	11	1.82	0.31	0.0717	92.8	57	0.0000284	0.0717	8	4	2020-05-20 to 2023-11-02	0.242	0.454	0.18	82	11	0.000108	0.18
CCR-AP-5	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Increasing	No	21	7	1.25	NA	NA	NA	NA	NA	NA	8	6	2020-05-19 to 2023-11-02	1.16	0.837	0.00609	99.4	23	0.0004	0 00609
CCR-AP-6	Selenium, Total	No Trend	Stable	No	21	17	0.989	0.0981	0.563	43.7	20	0.00000955	0.563	8	7	2020-05-20 to 2023-11-02	0.363	-0.286	0.386	61.4	-8	-0.000123	0.386
CCR-AP-7	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Only one detected result.	No	21	3	0.258	NA	NA	NA	NA	NA	NA	8	1	2020-05-18 to 2023-11-06	0.0418	NA	NA	NA	NA	NA	NA
CCR-AP-8	Selenium, Total	No Trend	Stable	No	21	18	0.566	0.0687	0.693	30.7	14	0.00000611	0.693	8	8	2020-05-20 to 2023-11-02	0.527	-0.357	0.266	73.4	-10	-0.00015	0.266
CCR-AP-9	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	20	6	1.17	NA	NA	NA	NA	NA	NA	8	2	2019-10-22 to 2023-05-23	1.27	NA	NA	NA	NA	NA	NA
CCR-AP-1R	Thallium, Total	Increasing	No Trend	No	22	16	0.924	0.371	0.0187	98.1	84	0.0000313	0.0187	8	5	2020-11-13 to 2023-11-02	0.85	0.182	0.618	38.2	5	0.000015	0.618
CCR-AP-2	Thallium, Total	Increasing	No Trend	No	22	19	1.56	0.621	0.0000675	100	142	0.000056	0.0000675	8	7	2020-11-12 to 2023-11-02	1.41	0.296	0.379	62.1	8	0.000117	0.379
CCR-AP-3	Thallium, Total	Not Evaluated - Only one detected result.	Not Evaluated - No detected results.	No	21	1	0.283	NA	NA	NA	NA	NA	NA	8	0	2020-05-20 to 2023-11-02	0.314	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-4R	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	21	10	1.12	NA	NA	NA	NA	NA	NA	8	2	2020-05-20 to 2023-11-02	0.342	NA	NA	NA	NA	NA	NA
CCR-AP-5	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	21	7	1.59	NA	NA	NA	NA	NA	NA	8	4	2020-05-19 to 2023-11-02	0.579	0.242	0.507	49.3	6	0.000015	0.507
CCR-AP-6	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	21	8	1.09	NA	NA	NA	NA	NA	NA	8	0	2020-05-20 to 2023-11-02	0.314	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-7	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	23	4	0.399	NA	NA	NA	NA	NA	NA	8	0	2020-05-18 to 2023-11-06	0.314	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	21	5	0.483	NA	NA	NA	NA	NA	NA	8	0	2020-05-20 to 2023-11-02	0.314	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-9	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	20	9	1.55	NA	NA	NA	NA	NA	NA	8	0	2019-10-22 to 2023-05-23	1.25	NA	No detected results.	NA	NA	NA	No detected results.

Note:
Mann Kendall test run on seasonally adjusted data if seasonal trend identified. Seasonal trends identified based on Kruskall Wallis test and time series plots, where n seasons = 4 and (Dec-Feb, Mar-May, Jun-Aug, Sept-Nov).

Note:
Mann Kendall Trends are classified based on Aziz (2003) guidance.

Table A-5. Intrawell Arsenic Prediction Limit Calculations

			Baseline Data Characterization [a]												Prediction Limits		Parametric UPL Calculation Statistics			Non-Parametric UPL Calculation Statistics	
Location	Constituent	Units	Baseline Distribution [a]	Prediction Interval Calculation	min baseline sample date	max baseline sample sample	n	n, non-detects	max	mean	standard deviation	Trend (Baseline Data)	degrees of freedom	future samples (M)	Prediction Limit Calculation Method	UPL	confidence level (%)	t (percentile of student's t-test)	t quantile	actual confidence level (%)	false positive rate (%)
CCR-AP-2	Arsenic, Total	mg/L	Normal (Baseline, 95% Confidence)	Parametric	2016-06-10	2023-07-28	21	0	0.048	0.0143	0.0119	Increasing	20	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.0526	99	0.9975	3.153	NA	NA
CCR-AP-3	Arsenic, Total	mg/L	Normal (Baseline, 95% Confidence)	Parametric	2016-06-10	2023-05-23	20	0	0.095	0.0759	0.00848	Increasing	19	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.103	99	0.9975	3.174	NA	NA
CCR-AP-4R	Arsenic, Total	mg/L	Normal (Baseline, ln Trans, 95% Confidence)	Parametric (ln Transformed Data)	2016-06-10	2023-05-23	20	0	0.33	0.112	0.081	Increasing	19	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.707	99	0.9975	3.174	NA	NA
CCR-AP-5	Arsenic, Total	mg/L	Not normal (Baseline, ln Trans, 95% Confidence)	Non-Parametric	2016-06-10	2023-05-25	19	2	0.024	0.00355	0.00584	Increasing	18	4	Non-Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.3.1)	0.024	NA	NA	NA	82.6	17.4
CCR-AP-6	Arsenic, Total	mg/L	Normal (Baseline, 95% Confidence)	Parametric	2016-06-10	2023-05-23	20	0	0.12	0.0942	0.0221	Increasing	19	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.166	99	0.9975	3.174	NA	NA
CCR-AP-8	Arsenic, Total	mg/L	Normal (Baseline, 95% Confidence)	Parametric	2017-03-09	2023-05-25	20	0	0.12	0.091	0.0216	Increasing	19	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.161	99	0.9975	3.174	NA	NA

Note:

[a] Baseline data refer to the entire statistical dataset, except the 4 most recent data points. The 4 most recent data points are considered 'compliance' or 'recent' samples. Baseline datasets were re-tested for outliers, secular trends, and data normality. No outliers were removed.

Prediction limits calculated using simple replacement with the reporting limit for non-detect results.

Table A-6. Confidence Intervals

			Confidence Interval (CI) Dataset						CI Calculation [a]			SSL Confirmation		Non-Parametric CI Statistics (if applicable)	
Location	Constituent	Units	n	max (Rank n)	min (Rank 1)	median	mean	standard deviation	CI calculation method	degrees of freedom	95% Confidence LCL	GWPS	LCL > GWPS?	bootstrap iterations	bootstrap median
CCR-AP-2	Cobalt, Total	mg/L	22	0.091	0.0073	0.022	0.0277	0.02	Calculation of the Confidence Interval Around the Lognormal Mean (Parametric)	21	0.0175	0.081	No	NA	NA
CCR-AP-2	Lead, Total	mg/L	22	0.100	0.0023	0.0225	0.028	0.025	Calculation of the Confidence Interval Around the Lognormal Mean (Parametric)	21	0.0111	0.094	No	NA	NA
CCR-AP-5	Molybdenum, Total	mg/L	21	0.530	0.046	0.33	0.294	0.12	Calculation of the Confidence Interval Around the Normal Mean (Parametric)	20	0.239	0.100	Yes	NA	NA

Note:

Confidence intervals are calculated for analyte/well pairs with GWPS exceedances in the November 2023 dataset.

[a] The 95% lower confience level (LCL) is compared to the Groundwater Protection Standard (GWPS) to confirm a statistically significant level (SSL). The 99% confidence interval is also shown for purposes of comparison. UCL = upper confidence level.

Table A-7. Groundwater Protection Standard (GWPS) Summary

Background Location	Constituent	Units	Background Threshold Value (BTV)	BTV Type	MCL/RSL	GWPS	GWPS Source	BTV Calculation Method
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Antimony, Total	mg/L	0.02	Interwell UTL	0.006	0.02	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-2	Arsenic, Total	mg/L	0.0526	Intrawell UPL	0.01	0.0526	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-3	Arsenic, Total	mg/L	0.103	Intrawell UPL	0.01	0.103	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-4R	Arsenic, Total	mg/L	0.707	Intrawell UPL	0.01	0.707	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-5	Arsenic, Total	mg/L	0.024	Intrawell UPL	0.01	0.024	BTV	Non-Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.3.1)
CCR-AP-6	Arsenic, Total	mg/L	0.166	Intrawell UPL	0.01	0.166	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-8	Arsenic, Total	mg/L	0.161	Intrawell UPL	0.01	0.161	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Barium, Total	mg/L	0.72	Interwell UTL	2	2	MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Beryllium, Total	mg/L	0.01	Interwell UTL	0.004	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Cadmium, Total	mg/L	0.01	Interwell UTL	0.005	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Chromium, Total	mg/L	0.16	Interwell UTL	0.1	0.16	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Cobalt, Total	mg/L	0.081	Interwell UTL	0.006	0.081	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Fluoride	mg/L	0.681	Interwell UTL	4	4	MCL/RSL	Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.1)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Lead, Total	mg/L	0.094	Interwell UTL	0.015	0.094	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Lithium, Total	mg/L	0 23	Interwell UTL	0.04	0 23	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Mercury, Total	mg/L	0.002	Interwell UTL	0.002	0.002	BTV = MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Molybdenum, Total	mg/L	0.05	Interwell UTL	0.1	0.1	MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Radium-226 & 228	pCi/L	12.6	Interwell UTL	5	12.6	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Selenium, Total	mg/L	0.05	Interwell UTL	0.05	0.05	BTV = MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Thallium, Total	mg/L	0.01	Interwell UTL	0.002	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)

Background Threshold Values (BTVs) include Upper Threshold Limits (UTLs) calculated from pooled/interwell background data and Upper Prediction Limits (UPLs) for Arsenic calculated from intrawell data. Groundwater Protection Standard (GWPS) is the maximum value between the BTV and the Maximum Contaminant Level/Regional Screening Level (MCL/RSL).

Table A-8. Groundwater Protection Standard (GWPS) Comparison Table

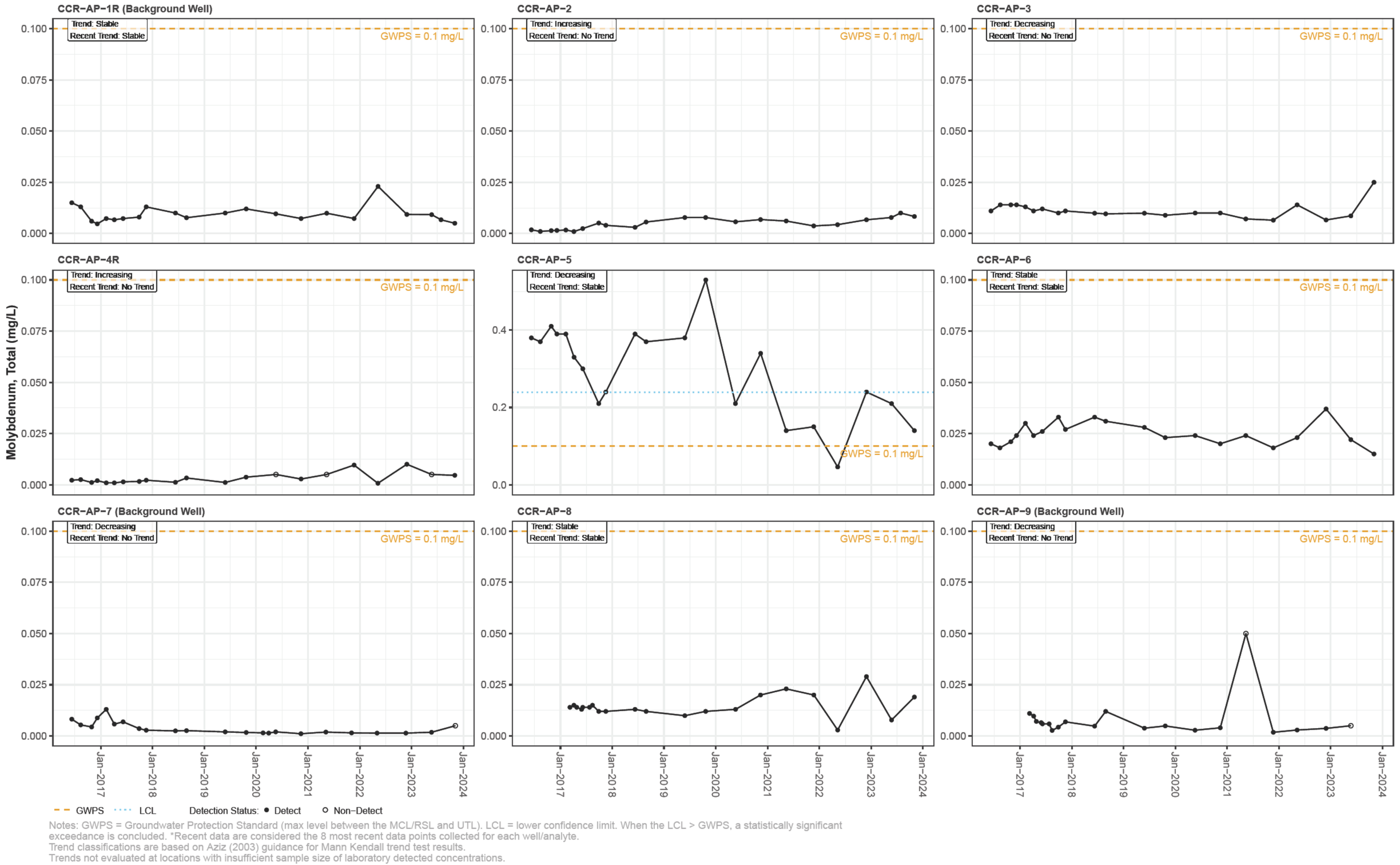
Location	Constituent	Units	Sample Date	Sample Result	Background Threshold Value (BTV)	BTV Type	GWPS	GWPS Exceedance	LCL	SSL Confirmed
CCR-AP-2	Antimony, Total	mg/L	2023-11-02	0.0013 J	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-3	Antimony, Total	mg/L	2023-11-02	0.005	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-4R	Antimony, Total	mg/L	2023-11-02	0.0031 J	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-5	Antimony, Total	mg/L	2023-11-02	0.0024 J	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-6	Antimony, Total	mg/L	2023-11-02	0.00066 J	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-8	Antimony, Total	mg/L	2023-11-02	0.00057 J	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-2	Arsenic, Total	mg/L	2023-11-02	0.04	0.0526	Intrawell UPL	0.0526	No	NA	No
CCR-AP-3	Arsenic, Total	mg/L	2023-11-02	0.089	0.103	Intrawell UPL	0.103	No	NA	No
CCR-AP-4R	Arsenic, Total	mg/L	2023-11-02	0.19	0.707	Intrawell UPL	0.707	No	NA	No
CCR-AP-5	Arsenic, Total	mg/L	2023-11-02	0.024	0.024	Intrawell UPL	0.024	No	NA	No
CCR-AP-6	Arsenic, Total	mg/L	2023-11-02	0.096	0.166	Intrawell UPL	0.166	No	NA	No
CCR-AP-8	Arsenic, Total	mg/L	2023-11-02	0.065	0.161	Intrawell UPL	0.161	No	NA	No
CCR-AP-2	Barium, Total	mg/L	2023-11-02	0.64	0.72	Interwell UTL	2	No	NA	No
CCR-AP-3	Barium, Total	mg/L	2023-11-02	0.48	0.72	Interwell UTL	2	No	NA	No
CCR-AP-4R	Barium, Total	mg/L	2023-11-02	0.92	0.72	Interwell UTL	2	No	NA	No
CCR-AP-5	Barium, Total	mg/L	2023-11-02	0.2	0.72	Interwell UTL	2	No	NA	No
CCR-AP-6	Barium, Total	mg/L	2023-11-02	0.48	0.72	Interwell UTL	2	No	NA	No
CCR-AP-8	Barium, Total	mg/L	2023-11-02	0.31	0.72	Interwell UTL	2	No	NA	No
CCR-AP-2	Beryllium, Total	mg/L	2023-11-02	0.0072	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-3	Beryllium, Total	mg/L	2023-11-02	0.00056	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-4R	Beryllium, Total	mg/L	2023-11-02	0.00047 J	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-5	Beryllium, Total	mg/L	2023-11-02	0.0016	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-6	Beryllium, Total	mg/L	2023-11-02	0.0005 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-8	Beryllium, Total	mg/L	2023-11-02	0.0005 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-2	Cadmium, Total	mg/L	2023-11-02	0.0023	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-3	Cadmium, Total	mg/L	2023-11-02	0.00038 J	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-4R	Cadmium, Total	mg/L	2023-11-02	0.0003 J	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-5	Cadmium, Total	mg/L	2023-11-02	0.0014	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-6	Cadmium, Total	mg/L	2023-11-02	0.000094 J	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-8	Cadmium, Total	mg/L	2023-11-02	0.00016 J	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-2	Chromium, Total	mg/L	2023-11-02	0.14	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-3	Chromium, Total	mg/L	2023-11-02	0.014	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-4R	Chromium, Total	mg/L	2023-11-02	0.012	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-5	Chromium, Total	mg/L	2023-11-02	0.056	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-6	Chromium, Total	mg/L	2023-11-02	0.0047 J	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-8	Chromium, Total	mg/L	2023-11-02	0.0016 J	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-2	Cobalt, Total	mg/L	2023-11-02	0.091	0.081	Interwell UTL	0.081	Yes	0.0175	No
CCR-AP-3	Cobalt, Total	mg/L	2023-11-02	0.0092	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-4R	Cobalt, Total	mg/L	2023-11-02	0.0049	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-5	Cobalt, Total	mg/L	2023-11-02	0.01	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-6	Cobalt, Total	mg/L	2023-11-02	0.0047	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-8	Cobalt, Total	mg/L	2023-11-02	0.0032	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-2	Fluoride	mg/L	2023-11-02	0.55	0.681	Interwell UTL	4	No	NA	No
CCR-AP-3	Fluoride	mg/L	2023-11-02	0.23	0.681	Interwell UTL	4	No	NA	No
CCR-AP-4R	Fluoride	mg/L	2023-11-02	0.48	0.681	Interwell UTL	4	No	NA	No
CCR-AP-5	Fluoride	mg/L	2023-11-02	2.3	0.681	Interwell UTL	4	No	NA	No
CCR-AP-6	Fluoride	mg/L	2023-11-02	0.51	0.681	Interwell UTL	4	No	NA	No
CCR-AP-8	Fluoride	mg/L	2023-11-02	1.1	0.681	Interwell UTL	4	No	NA	No
CCR-AP-2	Lead, Total	mg/L	2023-11-02	0.1	0.094	Interwell UTL	0.094	Yes	0.0111	No
CCR-AP-3	Lead, Total	mg/L	2023-11-02	0.01	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-4R	Lead, Total	mg/L	2023-11-02	0.011	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-5	Lead, Total	mg/L	2023-11-02	0.02	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-6	Lead, Total	mg/L	2023-11-02	0.0027 J	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-8	Lead, Total	mg/L	2023-11-02	0.003 U	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-2	Lithium, Total	mg/L	2023-11-02	0.11	0.23	Interwell UTL	0.23	No	NA	No
CCR-AP-3	Lithium, Total	mg/L	2023-11-02	0.0043 J	0.23	Interwell UTL	0.23	No	NA	No
CCR-AP-4R	Lithium, Total	mg/L	2023-11-02	0.0067	0.23	Interwell UTL	0.23	No	NA	No
CCR-AP-5	Lithium, Total	mg/L	2023-11-02	0.059	0.23	Interwell UTL	0.23	No	NA	No
CCR-AP-6	Lithium, Total	mg/L	2023-11-02	0.002 J	0.23	Interwell UTL	0.23	No	NA	No
CCR-AP-8	Lithium, Total	mg/L	2023-11-02	0.005 U	0.23	Interwell UTL	0.23	No	NA	No
CCR-AP-2	Mercury, Total	mg/L	2023-11-02	0.00042 J	0.002	Interwell UTL	0.002	No	NA	No

Background Threshold Values (BTVs) include Upper Threshold Limits (UTLs) calculated from pooled/interwell background data and Upper Prediction Limits (UPLs) for Arsenic calculated from intrawell data. Groundwater Protection Standard (GWPS) is the maximum value between the BTV and the Maximum Contaminant Level/Regional Screening Level (MCL/RSL). Lower Confidence Limit (LCL) calculated if the event sample result exceeds the GWPS. If the LCL is greater than the GWPS, a Statistically Significant Level (SSL) is confirmed.

Location	Constituent	Units	Sample Date	Sample Result	Background Threshold Value (BTV)	BTV Type	GWPS	GWPS Exceedance	LCL	SSL Confirmed
CCR-AP-3	Mercury, Total	mg/L	2023-11-02	0.0005 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-4R	Mercury, Total	mg/L	2023-11-02	0.0005 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-5	Mercury, Total	mg/L	2023-11-02	0.0016	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-6	Mercury, Total	mg/L	2023-11-02	0.0005 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-8	Mercury, Total	mg/L	2023-11-02	0.0005 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-2	Molybdenum, Total	mg/L	2023-11-02	0.0083	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-3	Molybdenum, Total	mg/L	2023-11-02	0.025	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-4R	Molybdenum, Total	mg/L	2023-11-02	0.0046 J	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-5	Molybdenum, Total	mg/L	2023-11-02	0.14	0.05	Interwell UTL	0.1	Yes	0.239	Yes
CCR-AP-6	Molybdenum, Total	mg/L	2023-11-02	0.015	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-8	Molybdenum, Total	mg/L	2023-11-02	0.019	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-2	Radium-226 & 228	pCi/L	2023-11-02	3.23 J+	12.6	Interwell UTL	12.6	No	NA	No
CCR-AP-3	Radium-226 & 228	pCi/L	2023-11-02	2 64 U	12.6	Interwell UTL	12.6	No	NA	No
CCR-AP-4R	Radium-226 & 228	pCi/L	2023-11-02	5 26 U	12.6	Interwell UTL	12.6	No	NA	No
CCR-AP-5	Radium-226 & 228	pCi/L	2023-11-02	5.54 J+	12.6	Interwell UTL	12.6	No	NA	No
CCR-AP-6	Radium-226 & 228	pCi/L	2023-11-02	2.72 U	12.6	Interwell UTL	12.6	No	NA	No
CCR-AP-8	Radium-226 & 228	pCi/L	2023-11-02	2.1 U	12.6	Interwell UTL	12.6	No	NA	No
CCR-AP-2	Selenium, Total	mg/L	2023-11-02	0.013	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-3	Selenium, Total	mg/L	2023-11-02	0.003 J	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-4R	Selenium, Total	mg/L	2023-11-02	0.0036 J	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-5	Selenium, Total	mg/L	2023-11-02	0.02	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-6	Selenium, Total	mg/L	2023-11-02	0.0012 J	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-8	Selenium, Total	mg/L	2023-11-02	0.0016 J	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-2	Thallium, Total	mg/L	2023-11-02	0.0012 J	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-3	Thallium, Total	mg/L	2023-11-02	0.002 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-4R	Thallium, Total	mg/L	2023-11-02	0.002 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-5	Thallium, Total	mg/L	2023-11-02	0.00096 J	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-6	Thallium, Total	mg/L	2023-11-02	0.002 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-8	Thallium, Total	mg/L	2023-11-02	0.002 U	0.01	Interwell UTL	0.01	No	NA	No

Background Threshold Values (BTVs) include Upper Threshold Limits (UTLs) calculated from pooled/interwell background data and Upper Prediction Limits (UPLs) for Arsenic calculated from intrawell data. Groundwater Protection Standard (GWPS) is the maximum value between the BTV and the Maximum Contaminant Level/Regional Screening Level (MCL/RSL). Lower Confidence Limit (LCL) calculated if the event sample result exceeds the GWPS. If the LCL is greater than the GWPS, a Statistically Significant Level (SSL) is confirmed.

Assessment Monitoring Trend Analysis for Molybdenum, Total



Notes: GWPS = Groundwater Protection Standard (max level between the MCL/RSL and UTL). LCL = lower confidence limit. When the LCL > GWPS, a statistically significant exceedance is concluded. *Recent data are considered the 8 most recent data points collected for each well/analyte.
Trend classifications are based on Aziz (2003) guidance for Mann Kendall trend test results.
Trends not evaluated at locations with insufficient sample size of laboratory detected concentrations.

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TECHNICAL MEMORANDUM

17 September 2024
File No. 0129420-032

TO: Southern Indiana Gas and Electric Company

FROM: Haley & Aldrich, Inc.
Todd Plating, Senior Project Manager
Steven F. Putrich, P.E., Project Principal

SUBJECT: Statistical Evaluation of the May 2024 Semi-annual Groundwater Assessment Monitoring Data
Southern Indiana Gas and Electric Company
East Ash Pond
F.B. Culley Generating Station; Warrick County, Indiana

Pursuant to Title 40 Code of Federal Regulations (40 CFR) § 257.93 and § 257.95 (Rule), this memorandum summarizes the statistical evaluation of the analytical results for the May 2024 semi-annual assessment monitoring event for the F.B. Culley Generating Station (FBC) East Ash Pond (EAP). Haley & Aldrich, Inc. (Haley & Aldrich) completed this statistical evaluation to determine if Appendix IV groundwater monitoring constituents have been detected in downgradient wells at statistically significant levels (SSL) greater than Groundwater Protection Standards (GWPS), consistent with the requirements in 40 CFR § 257.95.

Methods used during this statistical analysis are described in Haley & Aldrich's 2017 *Statistical Data Analysis Plan for the F.B. Culley Generating Station*. A summary of how applicable performance standards described in 40 CFR § 257.93 (g) were achieved include:

- 40 CFR § 257.93 (g) (1) - Data set distributions were evaluated using basic summary statistics, graphical methods including probability plots, and the Shapiro-Wilk Test for Normality. Data sets were also evaluated for statistical outliers using box plots and either Dixon's Q Test for Outliers or Rosner's Outlier Test depending on sample size. Outlier identification and data set distribution groups are summarized in Attachment A. For background limit calculations, parametric methods were used for normally distributed data sets and non-parametric methods were used for non-normally distributed data sets.
- 40 CFR § 257.93 (g) (2) – Not applicable
- 40 CFR § 257.93 (g) (3) – Not applicable

- 40 CFR § 257.93 (g) (4) – Levels of confidence and additional supporting information for the use of tolerance intervals and prediction limits are included in Attachment A.
- 40 CFR § 257.93 (g) (5) – Non-detect values were accounted for by simple substitution, where the reporting limit replaced the non-detect result. Non-detect values are identified and summarized in Attachment A.
- 40 CFR § 257.93 (g) (6) – Time series plots for groundwater monitoring wells included in this evaluation were reviewed to identify potential seasonal variability. Temporal trends were evaluated using the non-parametric Mann-Kendall Trend Test and Theil-Sen Estimator.

Data from the groundwater sampling event for the downgradient monitoring wells (CCR-AP-2 through CCR-AP-6 and CCR-AP-8) were compared to the GWPS established from the background dataset for the upgradient monitoring wells (CCR-AP-1R, CCR-AP-7, and CCR-AP-9) for detected Appendix IV constituents. The GWPS for each of the Appendix IV constituents has been set equal to the highest value among the maximum contaminant level (MCL), regional screening level (RSL), and background threshold value (BTV). The results of the assessment monitoring statistical evaluation are discussed below and provided in Attachment A.

Development of Groundwater Protection Standard

The Rule provides four specific options for statistical evaluation of groundwater quality data collected at a coal combustion residual (CCR) unit (40 CFR §257.93(f) (1-4)). Haley & Aldrich certified the tolerance limit (TL) as the statistical method used for developing BTVs on 14 January 2019. An alternate source demonstration was performed for arsenic on 13 September 2019, certifying the prediction limit (PL) as the statistical method for developing arsenic BTVs. As noted above, the GWPS for each of the Appendix IV constituents has been set equal to the highest value of the MCL, RSL, or BTV (either the TL or PL). The most recent groundwater sampling result from each compliance well was compared to the GWPS to determine if additional statistical testing is warranted.

STATISTICAL EVALUATION

BTVs are periodically updated per the document *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009* (Unified Guidance). Prior to calculating BTVs, data were evaluated for outlier results, data distribution, and spatial and temporal variability. Potential outlier sample results that would warrant removal from the data set based on likely error in sampling or measurement were identified through statistical outlier using the outliers (version 0.15) R programming package and either the Dixon's or Rosner's Test for Outliers. Potential outliers were further evaluated by visual inspection of box plots and probability plots, and field forms and analytical laboratory reports were reviewed as necessary. No sample data were identified as outliers that warranted removal from the dataset.

Background data distributions were assessed using the stats (version 4.3.3) R programming package and either the Shapiro-Wilk or Shapiro-Francia Test for Normality. Data distributions were further evaluated by visual inspection of probability and distribution plots. Data distributions inform appropriate BTV calculation methods.

Background and downgradient data sets were evaluated for spatial and temporal variability by visual inspection of box plots and time series plots and using the Mann-Kendall Trend Tests (Kendall R programming package, version 2.2.1) and Theil-Sen Estimator (trend R programming package, version 1.1.6). Spatial and temporal variability in background data sets inform appropriate BTV calculation methods.

Note that the CCR unit is in assessment monitoring, so Appendix III (detection monitoring) constituents were not evaluated.

Interwell Background Evaluation

An interwell statistical evaluation was used to determine the TL and identify potential SSLs for detected Appendix IV constituents, except arsenic (Table 1). The interwell evaluation compares the most recent value from downgradient compliance wells to a background dataset composed of pooled upgradient well data. TLs were calculated from the pooled background well dataset utilizing R programming language and the EnvStats (version 2.8.1) and tolerance (version 2.0.0) packages. The TL procedure is one in which a concentration limit for each constituent is established from the distribution of the background data, with a minimum 95 percent confidence level. The upper endpoint of a tolerance interval is called the UTL. Depending on the data distribution, parametric or non-parametric TL procedures are used. Parametric TLs utilize normally distributed data or data normalized via a transformation of the background data used to construct the limit. If the data are non-normal and a transformation is not indicated, non-parametric procedures (order statistics or bootstrap methods) are used to calculate the TL. If all the background data are non-detect, a maximum reporting limit may serve as an appropriate UTL.

Intrawell Background Evaluation for Arsenic

For arsenic, an intrawell statistical evaluation was used to determine the PL and identify potential SSLs. The intrawell evaluation compares the most recent data point from each downgradient compliance well to its well-specific background dataset, composed of data collected from the same well prior to the most recent sampling event. PLs were calculated from the well-specific background dataset utilizing R programming language and the stats (version 4.3.3) package. The PL procedure is one in which a concentration limit for each constituent at each downgradient well is established from the distribution of the background data, with a minimum 95 percent confidence level. The upper endpoint of a prediction interval is called the UPL. Depending on the data distribution, parametric or non-parametric PL procedures are used. Parametric PLs utilize normally distributed data or data normalized via a transformation of the background data used to construct the limit. If the data are non-normal and a transformation is not indicated, non-parametric procedures (order statistics or bootstrap methods) are used to calculate the PL. Note that the PL accounts for future variability based on existing data, so it is possible for the PL to be greater than the maximum measured background concentration.

GWPS Comparison and LCL Calculations

The lower confidence limits (LCL) were calculated for any Appendix IV constituent measured in a downgradient well during the May 2024 sampling event at a concentration greater than the GWPS. The LCL is the lower end of the confidence interval range, which is an estimated concentration range

intended to contain the true mean or median of the population from which the sample is drawn. The confidence interval range is designed to locate the true population mean or median with a high degree of statistical confidence, or conversely, with a low probability of error. An SSL is indicated when the downgradient well/constituent-specific LCL is greater than the GWPS.

TREND SUMMARY

Mann Kendall trend analyses were performed on data sets from downgradient wells of sufficient sample size as described above. Results of the trend analysis are summarized in Table 2. Trends indicated for constituents identified as SSLs are summarized below:

- Molybdenum was determined to be increasing at monitoring well locations CCR-AP-2 and CCR-AP-4R. Analytical results at those locations are below the GWPS.
- Molybdenum was determined to be stable at upgradient location CCR-AP-1R and downgradient location CCR-AP-8. No trend established at CCR-AP-6.
- Molybdenum was determined to be decreasing at upgradient locations CCR-AP-7 and CCR-AP-9, along with downgradient locations CCR-AP-3 and CCR-AP-5.

RESULTS OF APPENDIX IV DOWNGRADIENT STATISTICAL COMPARISONS

The sample concentrations from the downgradient wells for each of the detected Appendix IV constituents from the May 2024 assessment monitoring event were compared to their respective GWPS (Attachment A). LCLs were calculated where constituents were detected at concentrations greater than the GWPS. An SSL is indicated when the LCL is greater than the GWPS. SSLs are summarized in the table below. Based on previous compliance sampling events and statistical evaluations, interwell comparisons were used to evaluate constituents not subject to an Alternative Source Demonstration (ASD) in downgradient monitoring wells. Because a successful ASD was completed for arsenic, an intrawell statistical analysis was used to evaluate that constituent.

The results of the statistical analyses conducted for detected Appendix IV constituents confirm that molybdenum remains the only SSL downgradient of the EAP. As a result, the EAP will remain in Assessment Monitoring.

Table 1. Statistically Significant Level Summary – Appendix IV Constituents

Location ID	Trend	Constituent	Newly Identified SSL	Concentration (mg/L)
CCR-AP-5	Decrease	Molybdenum	No	0.15

Notes:
mg/L= milligrams per liter

Enclosure:

Table 2 – Trend Summary
Attachment A - Assessment Monitoring Statistical Analysis Summary – May 2024

TABLES

Table 2. Trend Summary

Location	Chemical	Units	Identified Trends		Trend Analysis on All Available Data					Trend Analysis on Recent Data				
			Trend (All Data)	Trend (Recent Data)	Results, n	Detected Results, n	Max Concentration	Sen Slope (magnitude per year)	p-value	*Results, n	*Detected Results, n	*Max Concentration	*Sen Slope (magnitude per year)	*p-value
CCR-AP-1R	Antimony, Total	mg/L	No Trend	Probably Decreasing	23	17	0.01	5e-06	0.69	8	8	0.0041	-0.000243	0.0635
CCR-AP-2	Antimony, Total	mg/L	No Trend	No Trend	23	14	0.01	1.58e-05	0.191	8	8	0.0079	4.85e-05	0.803
CCR-AP-3	Antimony, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	22	5	0.005	NA	NA	8	3	0.005	NA	NA
CCR-AP-4R	Antimony, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	22	7	0.028	NA	NA	8	5	0.028	0	1
CCR-AP-5	Antimony, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	22	6	0.01	NA	NA	8	5	0.0047	0.000114	0.126
CCR-AP-6	Antimony, Total	mg/L	No Trend	No Trend	22	13	0.018	0	0.861	8	6	0.018	0	1
CCR-AP-7	Antimony, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	24	3	0.0025	NA	NA	8	0	0.0025	NA	NA
CCR-AP-8	Antimony, Total	mg/L	Stable	No Trend	22	16	0.0046	-1.92e-05	0.128	8	7	0.0046	-6.89e-05	0.386
CCR-AP-9	Antimony, Total	mg/L	No Trend	No Trend	21	15	0.01	-2.94e-06	0.785	8	6	0.01	-0.000108	0.536
CCR-AP-1R	Arsenic, Total	mg/L	Increasing	Decreasing	23	23	0.038	0.000577	0.0302	8	8	0.034	-0.00287	0.0354
CCR-AP-2	Arsenic, Total	mg/L	Increasing	Increasing	23	23	0.048	0.00133	4.64e-05	8	8	0.048	0.005	0.0354
CCR-AP-3	Arsenic, Total	mg/L	Probably Increasing	Stable	22	22	0.095	0.000625	0.0883	8	8	0.095	-0.00213	0.445
CCR-AP-4R	Arsenic, Total	mg/L	Increasing	Stable	22	22	0.33	0.00529	0.0101	8	8	0.33	-0.00778	0.711
CCR-AP-5	Arsenic, Total	mg/L	Increasing	No Trend	21	19	0.024	0.00014	0.0037	8	8	0.024	0.00165	0.212
CCR-AP-6	Arsenic, Total	mg/L	Probably Increasing	Stable	22	22	0.12	0.00171	0.0711	8	8	0.12	-0.00117	0.369
CCR-AP-7	Arsenic, Total	mg/L	Decreasing	Stable	24	24	0.018	-0.000242	0.00678	8	8	0.0062	-0.000525	0.319
CCR-AP-8	Arsenic, Total	mg/L	Increasing	Decreasing	22	22	0.12	0.0023	0.00706	8	8	0.12	-0.00958	0.0226
CCR-AP-9	Arsenic, Total	mg/L	No Trend	Stable	21	21	0.032	0.000129	0.432	8	8	0.02	-0.00142	0.174
CCR-AP-1R	Barium, Total	mg/L	Increasing	Stable	23	23	0.59	0.00909	0.0247	8	8	0.35	-0.00667	0.902
CCR-AP-2	Barium, Total	mg/L	Increasing	Increasing	23	23	0.83	0.0186	0.00138	8	8	0.83	0.105	0.000837
CCR-AP-3	Barium, Total	mg/L	No Trend	Stable	22	22	0.49	0.00125	0.364	8	8	0.49	-0.00633	0.386
CCR-AP-4R	Barium, Total	mg/L	No Trend	Stable	22	22	1.4	0	0.955	8	8	1.4	-0.005	1
CCR-AP-5	Barium, Total	mg/L	Increasing	No Trend	22	22	0.2	0.00312	0.000217	8	8	0.2	0.00945	0.536
CCR-AP-6	Barium, Total	mg/L	Stable	Decreasing	22	22	0.69	-0.004	0.133	8	8	0.69	-0.0167	0.0248
CCR-AP-7	Barium, Total	mg/L	Decreasing	Stable	24	24	0.19	-0.00226	0.00921	8	8	0.13	-0.00367	0.61
CCR-AP-8	Barium, Total	mg/L	Decreasing	Decreasing	22	22	0.68	-0.0114	0.00051	8	8	0.57	-0.0367	0.0126
CCR-AP-9	Barium, Total	mg/L	No Trend	Stable	21	21	0.72	0.00481	0.172	8	8	0.39	-0.0138	0.454
CCR-AP-1R	Beryllium, Total	mg/L	Increasing	Decreasing	23	23	0.0066	0.000138	0.0175	8	8	0.0061	-0.000662	0.0354
CCR-AP-2	Beryllium, Total	mg/L	Increasing	No Trend	23	23	0.0077	0.000162	0.000114	8	8	0.0077	0.000532	0.386
CCR-AP-3	Beryllium, Total	mg/L	Not Evaluated - Only one detected result	Not Evaluated - Only one detected result	22	1	0.00056	NA	NA	8	1	0.00056	NA	NA
CCR-AP-4R	Beryllium, Total	mg/L	Increasing	Stable	22	15	0.0017	1.69e-05	0.00759	8	4	0.0017	-1.29e-05	0.232
CCR-AP-5	Beryllium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Only one detected result	22	6	0.005	NA	NA	8	1	0.0016	NA	NA
CCR-AP-6	Beryllium, Total	mg/L	No Trend	Not Evaluated - Majority of data (>50%) non-detect	22	13	0.0025	8e-06	0.151	8	2	0.00096	NA	NA
CCR-AP-7	Beryllium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	24	7	0.00075	NA	NA	8	0	0.0005	NA	NA
CCR-AP-8	Beryllium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Only one detected result	22	6	0.0005	NA	NA	8	1	0.0005	NA	NA
CCR-AP-9	Beryllium, Total	mg/L	Probably Increasing	Stable	21	19	0.005	3.14e-05	0.0846	8	6	0.005	-0.000113	0.386
CCR-AP-1R	Cadmium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	23	10	0.005	NA	NA	8	6	0.0025	-4.25e-05	0.386
CCR-AP-2	Cadmium, Total	mg/L	Increasing	No Trend	23	20	0.0066	6.25e-05	0.0055	8	8	0.0066	0.000237	0.174
CCR-AP-3	Cadmium, Total	mg/L	Not Evaluated - Only one detected result	Not Evaluated - Only one detected result	22	1	0.0005	NA	NA	8	1	0.0005	NA	NA
CCR-AP-4R	Cadmium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Stable	22	10	0.0025	NA	NA	8	4	0.00079	0	1
CCR-AP-5	Cadmium, Total	mg/L	No Trend	No Trend	22	16	0.005	4.55e-06	0.57	8	5	0.0014	2.46e-05	0.61
CCR-AP-6	Cadmium, Total	mg/L	No Trend	Not Evaluated - Majority of data (>50%) non-detect	22	13	0.0011	0	0.272	8	2	0.0011	NA	NA
CCR-AP-7	Cadmium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	24	2	0.0005	NA	NA	8	0	0.0005	NA	NA
CCR-AP-8	Cadmium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	22	6	0.00064	NA	NA	8	3	0.00064	NA	NA
CCR-AP-9	Cadmium, Total	mg/L	Increasing	Not Evaluated - Majority of data (>50%) non-detect	21	11	0.005	2.26e-05	0.00325	8	2	0.005	NA	NA
CCR-AP-1R	Chromium, Total	mg/L	Increasing	Stable	23	23	0.16	0.00236	0.0322	8	8	0.11	-0.00746	0.174
CCR-AP-2	Chromium, Total	mg/L	Increasing	Increasing	23	23	0.14	0.00423	9.28e-05	8	8	0.14	0.0176	0.00198
CCR-AP-3	Chromium, Total	mg/L	Probably Increasing	No Trend	22	18	0.014	5e-05	0.0868	8	7	0.014	0.000225	0.212
CCR-AP-4R	Chromium, Total	mg/L	No Trend	Stable	21	18	0.0488	0.000267	0.123	8	7	0.0488	-0.000137	0.902
CCR-AP-5	Chromium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	22	6	0.056	NA	NA	8	5	0.056	0.000875	0.203

Abbreviations: mg/L = milligrams per liter; n = sample count; pCi/L = picocuries per liter.

Notes: *Recent data defined as the 8 most recent data points. MK = Mann Kendall Trend Test. Secular Trend Classification based on Aziz (2003) guidance and MK Results. Thiel-Sen slope and p-value evaluated at 95% confidence level to confirm MK trends.

Additional information about trend analysis provided in Attachment A.

Location	Chemical	Units	Identified Trends		Trend Analysis on All Available Data					Trend Analysis on Recent Data				
			Trend (All Data)	Trend (Recent Data)	Results, n	Detected Results, n	Max Concentration	Sen Slope (magnitude per year)	p-value	*Results, n	*Detected Results, n	*Max Concentration	*Sen Slope (magnitude per year)	*p-value
CCR-AP-6	Chromium, Total	mg/L	Stable	No Trend	22	21	0.043	-0.000237	0.296	8	7	0.043	-0.00066	0.536
CCR-AP-7	Chromium, Total	mg/L	No Trend	Not Evaluated - No detected results	24	12	0.019	0	0.723	8	0	0.005	NA	NA
CCR-AP-8	Chromium, Total	mg/L	No Trend	Stable	21	19	0.014	1.61e-05	0.832	8	7	0.014	-0.000237	0.711
CCR-AP-9	Chromium, Total	mg/L	Increasing	Stable	21	21	0.15	0.000926	0.0252	8	8	0.045	-0.000571	0.803
CCR-AP-1R	Cobalt, Total	mg/L	Increasing	Probably Decreasing	23	23	0.081	0.00169	0.015	8	8	0.08	-0.0058	0.0635
CCR-AP-2	Cobalt, Total	mg/L	Increasing	Increasing	23	23	0.091	0.0017	2.08e-05	8	8	0.091	0.00704	0.0187
CCR-AP-3	Cobalt, Total	mg/L	Decreasing	No Trend	22	22	0.0094	-0.000175	0.000877	8	8	0.0092	0.000236	0.386
CCR-AP-4R	Cobalt, Total	mg/L	No Trend	Stable	22	22	0.0173	2.43e-05	0.714	8	8	0.0173	-0.000189	0.902
CCR-AP-5	Cobalt, Total	mg/L	Decreasing	No Trend	22	22	0.01	-0.00032	0.00189	8	8	0.01	0.000558	0.212
CCR-AP-6	Cobalt, Total	mg/L	Stable	Stable	22	22	0.019	-0.00022	0.108	8	8	0.019	-0.000417	0.212
CCR-AP-7	Cobalt, Total	mg/L	Decreasing	No Trend	24	22	0.015	-8.48e-05	0.00631	8	6	0.001	2.47e-05	0.536
CCR-AP-8	Cobalt, Total	mg/L	Decreasing	Stable	22	22	0.017	-0.000467	0.000149	8	8	0.012	-0.000658	0.386
CCR-AP-9	Cobalt, Total	mg/L	No Trend	Stable	21	21	0.047	0.00025	0.153	8	8	0.023	-0.001	0.445
CCR-AP-1R	Fluoride	mg/L	Decreasing	Decreasing	23	23	0.81	-0.00818	0.00158	8	8	0.63	-0.0314	0.00277
CCR-AP-2	Fluoride	mg/L	Increasing	Stable	23	23	0.69	0.0143	0.00136	8	8	0.69	-0.0357	0.319
CCR-AP-3	Fluoride	mg/L	Stable	Stable	22	21	0.93	-0.00933	0.185	8	8	0.57	-0.0104	0.711
CCR-AP-4R	Fluoride	mg/L	No Trend	Probably Increasing	22	21	0.64	0.00667	0.15	8	8	0.61	0.0383	0.0635
CCR-AP-5	Fluoride	mg/L	Increasing	Stable	22	22	2.3	0.0429	0.00782	8	8	2.3	0	1
CCR-AP-6	Fluoride	mg/L	Stable	Stable	22	22	0.69	-0.00467	0.446	8	8	0.69	-0.005	1
CCR-AP-7	Fluoride	mg/L	Increasing	Stable	23	23	0.72	0.00667	0.0212	8	8	0.72	-0.021	0.536
CCR-AP-8	Fluoride	mg/L	No Trend	No Trend	22	21	1.1	0.00438	0.366	8	8	1.1	0.01	0.454
CCR-AP-9	Fluoride	mg/L	No Trend	Stable	21	21	0.42	0.00118	0.693	8	8	0.39	-0.0065	0.454
CCR-AP-1R	Lead, Total	mg/L	Increasing	Stable	23	23	0.094	0.00173	0.0162	8	8	0.078	-0.00715	0.108
CCR-AP-2	Lead, Total	mg/L	Increasing	Increasing	23	23	0.1	0.0025	0.000102	8	8	0.1	0.0101	0.00937
CCR-AP-3	Lead, Total	mg/L	Increasing	No Trend	22	18	0.01	2.67e-05	0.0203	8	7	0.01	0.000151	0.266
CCR-AP-4R	Lead, Total	mg/L	No Trend	Stable	22	21	0.0386	0.000142	0.397	8	7	0.0386	-0.000692	0.386
CCR-AP-5	Lead, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	22	9	0.02	NA	NA	8	7	0.02	0.0003	0.174
CCR-AP-6	Lead, Total	mg/L	No Trend	No Trend	22	22	0.041	-0.000167	0.446	8	8	0.041	-0.000437	0.902
CCR-AP-7	Lead, Total	mg/L	Probably Decreasing	Not Evaluated - Majority of data (>50%) non-detect	24	14	0.02	-3.32e-05	0.0621	8	2	0.0015	NA	NA
CCR-AP-8	Lead, Total	mg/L	No Trend	No Trend	22	21	0.0076	3.83e-05	0.224	8	7	0.0061	3.75e-05	0.902
CCR-AP-9	Lead, Total	mg/L	Probably Increasing	Stable	21	21	0.041	0.000426	0.0904	8	8	0.025	-0.00173	0.386
CCR-AP-1R	Lithium, Total	mg/L	Probably Increasing	Stable	23	23	0.23	0.00307	0.0639	8	8	0.15	-0.00804	0.319
CCR-AP-2	Lithium, Total	mg/L	Increasing	Increasing	23	18	0.125	0.002	0.0211	8	8	0.11	0.014	0.00198
CCR-AP-3	Lithium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	22	4	0.025	NA	NA	8	4	0.0043	0	0.894
CCR-AP-4R	Lithium, Total	mg/L	Stable	Stable	22	16	0.047	-0.000262	0.231	8	7	0.025	-0.0002	1
CCR-AP-5	Lithium, Total	mg/L	Decreasing	No Trend	22	22	0.15	-0.00514	9.12e-06	8	8	0.072	0.002	0.711
CCR-AP-6	Lithium, Total	mg/L	Decreasing	No Trend	22	11	0.125	-0.00127	6.5e-05	8	5	0.018	3.57e-05	1
CCR-AP-7	Lithium, Total	mg/L	Decreasing	No Trend	24	24	0.039	-0.0002	0.00968	8	8	0.011	0.000204	0.319
CCR-AP-8	Lithium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	22	6	0.025	NA	NA	8	2	0.0067	NA	NA
CCR-AP-9	Lithium, Total	mg/L	Probably Increasing	Stable	21	21	0.12	0.000554	0.0845	8	8	0.064	-0.000625	0.902
CCR-AP-1R	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	22	0	0.001	NA	NA	8	0	0.001	NA	NA
CCR-AP-2	Mercury, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Probably Increasing	22	9	0.00071	NA	NA	8	6	0.00071	4.05e-05	0.0809
CCR-AP-3	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	21	0	0.00025	NA	NA	8	0	0.00025	NA	NA
CCR-AP-4R	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	21	0	0.00025	NA	NA	8	0	0.00025	NA	NA
CCR-AP-5	Mercury, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	21	3	0.0016	NA	NA	8	3	0.0016	NA	NA
CCR-AP-6	Mercury, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	21	2	0.00041	NA	NA	8	2	0.00041	NA	NA
CCR-AP-7	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	21	0	0.00025	NA	NA	8	0	0.00025	NA	NA
CCR-AP-8	Mercury, Total	mg/L	Not Evaluated - Only one detected result	Not Evaluated - Only one detected result	21	1	0.00026	NA	NA	8	1	0.00026	NA	NA
CCR-AP-9	Mercury, Total	mg/L	Not Evaluated - No detected results	Not Evaluated - No detected results	20	0	0.0001	NA	NA	8	0	0.0001	NA	NA
CCR-AP-1R	Molybdenum, Total	mg/L	Stable	Decreasing	23	23	0.023	-7.78e-05	0.442	8	8	0.023	-0.000758	0.0354
CCR-AP-2	Molybdenum, Total	mg/L	Increasing	No Trend	23	23	0.01	0.000331	2.61e-05	8	8	0.01	0.0005	0.108
CCR-AP-3	Molybdenum, Total	mg/L	Decreasing	No Trend	22	22	0.025	-0.000262	0.00494	8	8	0.025	0.000371	0.536
CCR-AP-4R	Molybdenum, Total	mg/L	Increasing	No Trend	22	19	0.017	0.000153	0.00918	8	6	0.017	0.0011	0.319
CCR-AP-5	Molybdenum, Total	mg/L	Decreasing	Stable	22	22	0.53	-0.012	0.00136	8	8	0.34	-0.0138	0.706
CCR-AP-6	Molybdenum, Total	mg/L	No Trend	No Trend	22	22	0.043	0	0.821	8	8	0.043	0.00117	0.711
CCR-AP-7	Molybdenum, Total	mg/L	Decreasing	No Trend	24	23	0.013	-0.000227	5.4e-06	8	7	0.0025	5.18e-05	0.803
CCR-AP-8	Molybdenum, Total	mg/L	Stable	Stable	22	22	0.029	0	0.668	8	8	0.029	-0.000971	0.454
CCR-AP-9	Molybdenum, Total	mg/L	Decreasing	No Trend	21	19	0.025	-0.0003	0.0011	8	6	0.025	-0.00025	0.266
CCR-AP-1R	Radium-226 & 228	pCi/L	No Trend	No Trend	21	21	14.4	0.124	0.124	8	8	14.4	1.24	0.266
CCR-AP-2	Radium-226 & 228	pCi/L	No Trend	No Trend	21	21	5.53	0.0183	0.695	8	8	5.53	0.222	0.711
CCR-AP-3	Radium-226 & 228	pCi/L	No Trend	No Trend	20	20	4.87	0.00597	0.922	8	8	4.87	0.0326	0.902
CCR-AP-4R	Radium-226 & 228	pCi/L	No Trend	No Trend	20	20	30	-0.0041	0.974	8	8	30	0.117	0.711
CCR-AP-5	Radium-226 & 228	pCi/L	No Trend	No Trend	20	20	5.54	0.0379	0.315	8	8	5.54	0.506	0.108

Abbreviations: mg/L = milligrams per liter; n = sample count; pCi/L = picocuries per liter.

Notes: *Recent data defined as the 8 most recent data points. MK = Mann Kendall Trend Test. Secular Trend Classification based on Aziz (2003) guidance and MK Results. Thiel-Sen slope and p-value evaluated at 95% confidence level to confirm MK trends.

Additional information about trend analysis provided in Attachment A.

			Identified Trends		Trend Analysis on All Available Data					Trend Analysis on Recent Data				
Location	Chemical	Units	Trend (All Data)	Trend (Recent Data)	Results, n	Detected Results, n	Max Concentration	Sen Slope (magnitude per year)	p-value	*Results, n	*Detected Results, n	*Max Concentration	*Sen Slope (magnitude per year)	*p-value
CCR-AP-6	Radium-226 & 228	pCi/L	Stable	Stable	20	19	10.2	-0.000548	1	8	7	3.21	-0.00971	1
CCR-AP-7	Radium-226 & 228	pCi/L	Stable	Increasing	21	21	1.72	-0.0149	0.487	8	8	1.44	0.117	0.0354
CCR-AP-8	Radium-226 & 228	pCi/L	Stable	Stable	19	19	2.88	-0.0164	0.441	8	8	2.88	-0.0715	0.902
CCR-AP-9	Radium-226 & 228	pCi/L	Increasing	No Trend	19	19	12.6	0.182	0.0424	8	8	12.6	0.644	0.266
CCR-AP-1R	Selenium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	23	10	0.025	NA	NA	8	5	0.0125	-0.0003	0.319
CCR-AP-2	Selenium, Total	mg/L	Increasing	No Trend	23	16	0.026	0.00012	0.018	8	7	0.013	0.000105	0.536
CCR-AP-3	Selenium, Total	mg/L	No Trend	No Trend	22	21	0.0068	1.11e-05	0.23	8	8	0.003	0	0.898
CCR-AP-4R	Selenium, Total	mg/L	Probably Increasing	Not Evaluated - Majority of data (>50%) non-detect	22	11	0.031	1.67e-05	0.0561	8	3	0.0036	NA	NA
CCR-AP-5	Selenium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	22	8	0.025	NA	NA	8	6	0.02	0.000312	0.319
CCR-AP-6	Selenium, Total	mg/L	No Trend	Stable	22	17	0.0125	2e-05	0.378	8	6	0.003	-1e-05	1
CCR-AP-7	Selenium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	22	3	0.0028	NA	NA	8	0	0.0025	NA	NA
CCR-AP-8	Selenium, Total	mg/L	No Trend	Stable	22	19	0.007	7.14e-06	0.609	8	8	0.0051	-1.25e-05	1
CCR-AP-9	Selenium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	21	6	0.025	NA	NA	8	2	0.025	NA	NA
CCR-AP-1R	Thallium, Total	mg/L	Increasing	Stable	23	16	0.0027	2.6e-05	0.0357	8	5	0.0027	-1.1e-05	0.803
CCR-AP-2	Thallium, Total	mg/L	Increasing	No Trend	23	20	0.0076	5e-05	5.15e-05	8	8	0.0076	6.75e-05	0.803
CCR-AP-3	Thallium, Total	mg/L	Not Evaluated - Only one detected result	Not Evaluated - No detected results	22	1	0.001	NA	NA	8	0	0.001	NA	NA
CCR-AP-4R	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - Majority of data (>50%) non-detect	22	10	0.0025	NA	NA	8	2	0.001	NA	NA
CCR-AP-5	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	No Trend	22	7	0.005	NA	NA	8	4	0.00096	5.67e-05	0.232
CCR-AP-6	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	22	8	0.0025	NA	NA	8	0	0.001	NA	NA
CCR-AP-7	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	24	4	0.001	NA	NA	8	0	0.001	NA	NA
CCR-AP-8	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	22	5	0.001	NA	NA	8	0	0.001	NA	NA
CCR-AP-9	Thallium, Total	mg/L	Not Evaluated - Majority of data (>50%) non-detect	Not Evaluated - No detected results	21	9	0.005	NA	NA	8	0	0.005	NA	NA

Abbreviations: mg/L = milligrams per liter; n = sample count; pCi/L = picocuries per liter.

Notes: *Recent data defined as the 8 most recent data points. MK = Mann Kendall Trend Test. Secular Trend Classification based on Aziz (2003) guidance and MK Results. Thiel-Sen slope and p-value evaluated at 95% confidence level to confirm MK trends.

Additional information about trend analysis provided in Attachment A.

ATTACHMENT A
Assessment Monitoring Statistical Analysis Summary – May 2024

Table A-1. Descriptive Statistics

Location	Constituent	Units	n	n, non-detects	percent of non-detects	max	min	mean	median	standard deviation	variance	reporting limit range	date range
CCR-AP-1R	Antimony, Total	mg/L	23	6	26	0.02000	0.00053	0.00347	0.0015	0.0056	3.1e-05	0.002 - 0.02	2016-06-10 to 2024-05-08
CCR-AP-2	Antimony, Total	mg/L	23	9	39	0.02000	0.00024	0.00347	0.002	0.0045	2.1e-05	0.002 - 0.02	2016-06-10 to 2024-05-08
CCR-AP-3	Antimony, Total	mg/L	22	17	77	0.00500	0.00031	0.00195	0.002	0.00085	7.2e-07	0.002 - 0.002	2016-06-10 to 2024-05-07
CCR-AP-4R	Antimony, Total	mg/L	22	15	68	0.02800	0.0004	0.00336	0.002	0.0058	3.4e-05	0.002 - 0.01	2016-06-10 to 2024-05-08
CCR-AP-5	Antimony, Total	mg/L	22	16	73	0.02000	5.8e-05	0.0027	0.002	0.004	1.6e-05	0.002 - 0.02	2016-06-10 to 2024-05-13
CCR-AP-6	Antimony, Total	mg/L	22	9	41	0.01800	0.00042	0.00246	0.00155	0.004	1.6e-05	0.002 - 0.01	2016-06-10 to 2024-05-07
CCR-AP-7	Antimony, Total	mg/L	24	21	88	0.00500	0.00016	0.00194	0.002	0.00082	6.8e-07	0.002 - 0.005	2016-06-10 to 2024-05-10
CCR-AP-8	Antimony, Total	mg/L	22	6	27	0.00460	0.0004	0.00132	0.00105	0.00096	9.2e-07	0.002 - 0.002	2017-03-09 to 2024-05-10
CCR-AP-9	Antimony, Total	mg/L	21	6	29	0.02000	0.00061	0.00425	0.0014	0.0059	3.4e-05	0.002 - 0.02	2017-03-09 to 2024-05-08
CCR-AP-1R	Arsenic, Total	mg/L	23	0	0	0.03800	0.0024	0.0162	0.012	0.011	0.00013	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Arsenic, Total	mg/L	23	0	0	0.04800	0.0016	0.0159	0.013	0.013	0.00016	NA	2016-06-10 to 2024-05-08
CCR-AP-3	Arsenic, Total	mg/L	22	0	0	0.09500	0.051	0.0754	0.077	0.01	0.0001	NA	2016-06-10 to 2024-05-07
CCR-AP-4R	Arsenic, Total	mg/L	22	0	0	0.33000	0.027	0.111	0.086	0.081	0.0066	NA	2016-06-10 to 2024-05-08
CCR-AP-5	Arsenic, Total	mg/L	21	2	10	0.02400	0.00039	0.0044	0.001	0.0072	5.1e-05	0.001 - 0.01	2016-06-10 to 2024-05-13
CCR-AP-6	Arsenic, Total	mg/L	22	0	0	0.12000	0.04	0.0926	0.1	0.022	0.0005	NA	2016-06-10 to 2024-05-07
CCR-AP-7	Arsenic, Total	mg/L	24	0	0	0.01800	0.00066	0.00567	0.00515	0.0042	1.7e-05	NA	2016-06-10 to 2024-05-10
CCR-AP-8	Arsenic, Total	mg/L	22	0	0	0.12000	0.013	0.0863	0.0925	0.027	0.00072	NA	2017-03-09 to 2024-05-10
CCR-AP-9	Arsenic, Total	mg/L	21	0	0	0.03200	0.0031	0.0101	0.0087	0.0063	4e-05	NA	2017-03-09 to 2024-05-08
CCR-AP-1R	Barium, Total	mg/L	23	0	0	0.59000	0.05	0.233	0.2	0.15	0.024	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Barium, Total	mg/L	23	0	0	0.83000	0.038	0.275	0.24	0.2	0.042	NA	2016-06-10 to 2024-05-08
CCR-AP-3	Barium, Total	mg/L	22	0	0	0.49000	0.38	0.429	0.425	0.033	0.0011	NA	2016-06-10 to 2024-05-07
CCR-AP-4R	Barium, Total	mg/L	22	0	0	1.40000	0.45	0.695	0.63	0.24	0.059	NA	2016-06-10 to 2024-05-08
CCR-AP-5	Barium, Total	mg/L	22	0	0	0.20000	0.029	0.0613	0.0415	0.044	0.0019	NA	2016-06-10 to 2024-05-13
CCR-AP-6	Barium, Total	mg/L	22	0	0	0.69000	0.43	0.575	0.575	0.072	0.0052	NA	2016-06-10 to 2024-05-07
CCR-AP-7	Barium, Total	mg/L	24	0	0	0.19000	0.076	0.127	0.12	0.029	0.00082	NA	2016-06-10 to 2024-05-10
CCR-AP-8	Barium, Total	mg/L	22	0	0	0.68000	0.27	0.531	0.565	0.11	0.012	NA	2017-03-09 to 2024-05-10
CCR-AP-9	Barium, Total	mg/L	21	0	0	0.72000	0.13	0.287	0.27	0.12	0.015	NA	2017-03-09 to 2024-05-08
CCR-AP-1R	Beryllium, Total	mg/L	23	0	0	0.00660	0.00011	0.00262	0.002	0.0021	4.6e-06	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Beryllium, Total	mg/L	23	0	0	0.00770	0.00014	0.00217	0.0019	0.002	4.2e-06	NA	2016-06-10 to 2024-05-08
CCR-AP-3	Beryllium, Total	mg/L	22	21	95	0.00100	0.00056	0.00098	0.001	9.4e-05	8.8e-09	0.001 - 0.001	2016-06-10 to 2024-05-07
CCR-AP-4R	Beryllium, Total	mg/L	22	7	32	0.00170	0.00014	0.000707	0.000725	0.00043	1.9e-07	0.001 - 0.001	2016-06-10 to 2024-05-08
CCR-AP-5	Beryllium, Total	mg/L	22	16	73	0.01000	0.00017	0.00132	0.001	0.002	3.9e-06	0.001 - 0.01	2016-06-10 to 2024-05-13
CCR-AP-6	Beryllium, Total	mg/L	22	9	41	0.00500	0.00011	0.000805	0.000575	0.00099	9.9e-07	0.0005 - 0.005	2016-06-10 to 2024-05-07
CCR-AP-7	Beryllium, Total	mg/L	24	17	71	0.00100	6.7e-05	0.00076	0.001	0.00037	1.4e-07	0.0005 - 0.001	2016-06-10 to 2024-05-10
CCR-AP-8	Beryllium, Total	mg/L	22	16	73	0.00100	0.00016	0.000774	0.001	0.00035	1.2e-07	0.0005 - 0.001	2017-03-09 to 2024-05-10
CCR-AP-9	Beryllium, Total	mg/L	21	2	10	0.01000	0.00017	0.00144	0.00092	0.0021	4.5e-06	0.001 - 0.01	2017-03-09 to 2024-05-08
CCR-AP-1R	Cadmium, Total	mg/L	23	13	57	0.01000	8.1e-05	0.00202	0.001	0.0029	8.7e-06	0.001 - 0.01	2016-06-10 to 2024-05-08
CCR-AP-2	Cadmium, Total	mg/L	23	3	13	0.01000	0.00011	0.00202	0.00089	0.0024	6e-06	0.005 - 0.01	2016-06-10 to 2024-05-08
CCR-AP-3	Cadmium, Total	mg/L	22	21	95	0.00100	0.00038	0.000972	0.001	0.00013	1.7e-08	0.001 - 0.001	2016-06-10 to 2024-05-07
CCR-AP-4R	Cadmium, Total	mg/L	22	12	55	0.00500	0.00014	0.000888	0.001	0.00099	9.7e-07	0.001 - 0.005	2016-06-10 to 2024-05-08
CCR-AP-5	Cadmium, Total	mg/L	22	6	27	0.01000	0.00015	0.00106	0.00057	0.002	4.1e-06	0.001 - 0.01	2016-06-10 to 2024-05-13
CCR-AP-6	Cadmium, Total	mg/L	22	9	41	0.00110	9.4e-05	0.000638	0.00056	0.00037	1.4e-07	0.001 - 0.001	2016-06-10 to 2024-05-07
CCR-AP-7	Cadmium, Total	mg/L	24	22	92	0.00100	0.00014	0.000915	0.001	0.00024	5.6e-08	0.0005 - 0.001	2016-06-10 to 2024-05-10
CCR-AP-8	Cadmium, Total	mg/L	22	16	73	0.00100	0.00016	0.000805	0.001	0.00034	1.1e-07	0.001 - 0.001	2017-03-09 to 2024-05-10
CCR-AP-9	Cadmium, Total	mg/L	21	10	48	0.01000	7.9e-05	0.0018	0.0004	0.0031	9.4e-06	0.001 - 0.01	2017-03-09 to 2024-05-08
CCR-AP-1R	Chromium, Total	mg/L	23	0	0	0.16000	0.0019	0.0557	0.036	0.047	0.0022	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Chromium, Total	mg/L	23	0	0	0.14000	0.003	0.0444	0.035	0.037	0.0014	NA	2016-06-10 to 2024-05-08
CCR-AP-3	Chromium, Total	mg/L	22	4	18	0.01400	0.0018	0.00297	0.0021	0.0026	6.5e-06	0.002 - 0.002	2016-06-10 to 2024-05-07
CCR-AP-4R	Chromium, Total	mg/L	21	3	14	0.05800	0.0015	0.0126	0.0076	0.014	0.00021	0.002 - 0.005	2016-06-10 to 2024-05-08
CCR-AP-5	Chromium, Total	mg/L	22	16	73	0.05600	0.0014	0.00672	0.002	0.013	0.00016	0.002 - 0.02	2016-06-10 to 2024-05-13
CCR-AP-6	Chromium, Total	mg/L	22	1	5	0.04300	0.0019	0.0128	0.0095	0.011	0.00012	0.002 - 0.002	2016-06-10 to 2024-05-07
CCR-AP-7	Chromium, Total	mg/L	24	12	50	0.01900	0.00047	0.00389	0.002	0.0039	1.5e-05	0.002 - 0.01	2016-06-10 to 2024-05-10
CCR-AP-8	Chromium, Total	mg/L	21	2	10	0.01400	0.0012	0.0043	0.0029	0.0034	1.2e-05	0.002 - 0.0034	2017-03-09 to 2024-05-10
CCR-AP-9	Chromium, Total	mg/L	21	0	0	0.15000	0.0042	0.0254	0.016	0.031	0.00096	NA	2017-03-09 to 2024-05-08
CCR-AP-1R	Cobalt, Total	mg/L	23	0	0	0.08100	0.0015	0.031	0.019	0.026	0.00066	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Cobalt, Total	mg/L	23	0	0	0.09100	0.0073	0.0286	0.023	0.02	0.00039	NA	2016-06-10 to 2024-05-08
CCR-AP-3	Cobalt, Total	mg/L	22	0	0	0.00940	0.004	0.00603	0.00565	0.0015	2.4e-06	NA	2016-06-10 to 2024-05-07
CCR-AP-4R	Cobalt, Total	mg/L	22	0	0	0.02100	0.00071	0.00682	0.0052	0.0055	3.1e-05	NA	2016-06-10 to 2024-05-08
CCR-AP-5	Cobalt, Total	mg/L	22	0	0	0.01000	0.00036	0.004	0.00365	0.0026	6.6e-06	NA	2016-06-10 to 2024-05-13
CCR-AP-6	Cobalt, Total	mg/L	22	0	0	0.01900	0.0034	0.00855	0.0074	0.0045	2e-05	NA	2016-06-10 to 2024-05-07
CCR-AP-7	Cobalt, Total	mg/L	24	2	8	0.01500	0.00021	0.00218	0.000935	0.0032	1e-05	0.0005 - 0.002	2016-06-10 to 2024-05-10
CCR-AP-8	Cobalt, Total	mg/L	22	0	0	0.01700	0.0026	0.00856	0.0081	0.0039	1.5e-05	NA	2017-03-09 to 2024-05-10
CCR-AP-9	Cobalt, Total	mg/L	21	0	0	0.04700	0.0061	0.0148	0.014	0.0085	7.2e-05	NA	2017-03-09 to 2024-05-08
CCR-AP-1R	Fluoride	mg/L	23	0	0	0.81000	0.25	0.495	0.48	0.11	0.012	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Fluoride	mg/L	23	0	0	0.69000	0.11	0.362	0.3	0.15	0.022	NA	2016-06-10 to 2024-05-08
CCR-AP-3	Fluoride	mg/L	22	1	5	0.93000	0.1	0.401	0.375	0.19	0.034	0.1 - 0.1	2016-06-10 to 2024-05-07
CCR-AP-4R	Fluoride	mg/L	22	1	5	0.64000	0.1	0.389	0.38	0.12	0.014	0.1 - 0.1	2016-06-10 to 2024-05-08
CCR-AP-5	Fluoride	mg/L	22	0	0	2.30000	0.58	1.27	1.2	0.45	0.2	NA	2016-06-10 to 2024-05-13
CCR-AP-6	Fluoride	mg/L	22	0	0	0.69000	0.24	0.49	0.47	0.13	0.017	NA	2016-06-10 to 2024-05-07
CCR-AP-7	Fluoride	mg/L	23	0	0	0.72000	0.14	0.333	0.3	0.13	0.017	NA	2016-08-12 to 2024-05-10
CCR-AP-8	Fluoride	mg/L	22	1	5	1.10000	0.1	0.321	0.27	0.2	0.041	0.1 - 0.1	2017-03-09 to 2024-05-10
CCR-AP-9	Fluoride	mg/L	21	0	0	0.42000	0.14	0.329	0.34	0.064	0.0041	NA	2017-03-09 to 2024-05-08
CCR-AP-1R	Lead, Total	mg/L	23	0	0	0.09400	0.0011	0.0339	0.02	0.028	0.00079	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Lead, Total	mg/L	23	0	0	0.10000	0.0023	0.0292	0.026	0.025	0.00062	NA	2016-06-10 to 2024-05-08

Note:
Units: mg/L = milligrams per liter, pCi/L = picocuries per liter

Location	Constituent	Units	n	n, non-detects	percent of non-detects	max	min	mean	median	standard deviation	variance	reporting limit range	date range
CCR-AP-3	Lead, Total	mg/L	22	4	18	0.01000	0.00021	0.0012	0.00085	0.002	4e-06	0.001 - 0.001	2016-06-10 to 2024-05-07
CCR-AP-4R	Lead, Total	mg/L	22	1	5	0.04700	0.00052	0.0101	0.0047	0.012	0.00015	0.001 - 0.001	2016-06-10 to 2024-05-08
CCR-AP-5	Lead, Total	mg/L	22	13	59	0.02000	9.9e-05	0.00253	0.001	0.0046	2.1e-05	0.001 - 0.01	2016-06-10 to 2024-05-13
CCR-AP-6	Lead, Total	mg/L	22	0	0	0.04100	0.00039	0.00953	0.00685	0.0095	9.1e-05	NA	2016-06-10 to 2024-05-07
CCR-AP-7	Lead, Total	mg/L	24	10	42	0.02000	0.00013	0.00291	0.001	0.0043	1.9e-05	0.001 - 0.003	2016-06-10 to 2024-05-10
CCR-AP-8	Lead, Total	mg/L	22	1	5	0.00760	0.00027	0.00222	0.0019	0.0018	3.1e-06	0.003 - 0.003	2017-03-09 to 2024-05-10
CCR-AP-9	Lead, Total	mg/L	21	0	0	0.04100	0.0025	0.0124	0.01	0.0088	7.8e-05	NA	2017-03-09 to 2024-05-08
CCR-AP-1R	Lithium, Total	mg/L	23	0	0	0.23000	0.035	0.0914	0.076	0.054	0.0029	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Lithium, Total	mg/L	23	5	22	0.25000	0.01	0.0528	0.043	0.05	0.0025	0.05 - 0.25	2016-06-10 to 2024-05-08
CCR-AP-3	Lithium, Total	mg/L	22	18	82	0.05000	0.0021	0.0231	0.005	0.023	0.00052	0.005 - 0.05	2016-06-10 to 2024-05-07
CCR-AP-4R	Lithium, Total	mg/L	22	6	27	0.05000	0.0028	0.0205	0.0105	0.019	0.00036	0.005 - 0.05	2016-06-10 to 2024-05-08
CCR-AP-5	Lithium, Total	mg/L	22	0	0	0.15000	0.009	0.0914	0.0945	0.042	0.0017	NA	2016-06-10 to 2024-05-13
CCR-AP-6	Lithium, Total	mg/L	22	11	50	0.25000	0.0014	0.0327	0.014	0.052	0.0028	0.005 - 0.25	2016-06-10 to 2024-05-07
CCR-AP-7	Lithium, Total	mg/L	24	0	0	0.03900	0.007	0.0134	0.011	0.0067	4.5e-05	NA	2016-06-10 to 2024-05-10
CCR-AP-8	Lithium, Total	mg/L	22	16	73	0.05000	0.0031	0.0221	0.00735	0.022	0.00047	0.005 - 0.05	2017-03-09 to 2024-05-10
CCR-AP-9	Lithium, Total	mg/L	21	0	0	0.12000	0.029	0.0473	0.04	0.02	0.0004	NA	2017-03-09 to 2024-05-08
CCR-AP-1R	Mercury, Total	mg/L	22	22	100	0.00200	0.0002	0.000309	0.0002	0.00039	1.5e-07	0.0002 - 0.002	2016-06-10 to 2024-05-08
CCR-AP-2	Mercury, Total	mg/L	22	13	59	0.00071	0.00015	0.000239	0.0002	0.00013	1.6e-08	0.0002 - 0.0002	2016-06-10 to 2024-05-08
CCR-AP-3	Mercury, Total	mg/L	21	21	100	0.00050	0.0002	0.000214	0.0002	6.5e-05	4.3e-09	0.0002 - 0.0005	2016-06-10 to 2024-05-07
CCR-AP-4R	Mercury, Total	mg/L	21	21	100	0.00050	0.0002	0.000224	0.0002	7.7e-05	5.9e-09	0.0002 - 0.0005	2016-06-10 to 2024-05-08
CCR-AP-5	Mercury, Total	mg/L	21	18	86	0.00160	0.0002	0.000306	0.0002	0.00033	1.1e-07	0.0002 - 0.0002	2016-06-10 to 2024-05-13
CCR-AP-6	Mercury, Total	mg/L	21	19	90	0.00050	0.00017	0.000223	0.0002	7.9e-05	6.2e-09	0.0002 - 0.0005	2016-06-10 to 2024-05-07
CCR-AP-7	Mercury, Total	mg/L	21	21	100	0.00050	0.0002	0.000214	0.0002	6.5e-05	4.3e-09	0.0002 - 0.0005	2016-06-10 to 2024-05-10
CCR-AP-8	Mercury, Total	mg/L	21	20	95	0.00050	0.0002	0.000217	0.0002	6.6e-05	4.4e-09	0.0002 - 0.0005	2017-03-09 to 2024-05- 0
CCR-AP-9	Mercury, Total	mg/L	20	20	100	0.00020	0.0002	0.0002	0.0002	0	0	0.0002 - 0.0002	2017-03-09 to 2024-05-08
CCR-AP-1R	Molybdenum, Total	mg/L	23	0	0	0.02300	0.0047	0.00927	0.008	0.004	1.6e-05	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Molybdenum, Total	mg/L	23	0	0	0.01000	0.00094	0.00478	0.0051	0.0027	7.3e-06	NA	2016-06-10 to 2024-05-08
CCR-AP-3	Molybdenum, Total	mg/L	22	0	0	0.02500	0.0065	0.0112	0.01	0.0039	1.5e-05	NA	2016-06-10 to 2024-05-07
CCR-AP-4R	Molybdenum, Total	mg/L	22	3	14	0.01700	0.00071	0.00381	0.00235	0.0039	1.5e-05	0.005 - 0.005	2016-06-10 to 2024-05-08
CCR-AP-5	Molybdenum, Total	mg/L	22	0	0	0.53000	0.046	0.287	0.315	0.12	0.014	NA	2016-06-10 to 2024-05-13
CCR-AP-6	Molybdenum, Total	mg/L	22	0	0	0.04300	0.015	0.0256	0.024	0.0067	4.5e-05	NA	2016-06-10 to 2024-05-07
CCR-AP-7	Molybdenum, Total	mg/L	24	1	4	0.01300	0.0011	0.00367	0.00225	0.003	9.2e-06	0.005 - 0.005	2016-06-10 to 2024-05-10
CCR-AP-8	Molybdenum, Total	mg/L	22	0	0	0.02900	0.0029	0.0144	0.0135	0.0054	2.9e-05	NA	2017-03-09 to 2024-05-10
CCR-AP-9	Molybdenum, Total	mg/L	21	2	10	0.05000	0.0017	0.0075	0.0049	0.01	0.0001	0.005 - 0.05	2017-03-09 to 2024-05-08
CCR-AP-1R	Radium-226 & 228	pCi/L	21	0	0	14.40000	0.862	4.87	5	3.3	11	NA	2016-06-10 to 2024-05-08
CCR-AP-2	Radium-226 & 228	pCi/L	21	0	0	5.53000	0.444	2.12	1.91	1.4	2	NA	2016-06-10 to 2024-05-08
CCR-AP-3	Radium-226 & 228	pCi/L	20	0	0	4.87000	0.593	1.75	1.67	1.1	1.3	NA	2016-06-10 to 2024-05-07
CCR-AP-4R	Radium-226 & 228	pCi/L	20	0	0	30.00000	1.07	3.76	2.39	6.3	39	NA	2016-06-10 to 2024-05-08
CCR-AP-5	Radium-226 & 228	pCi/L	20	0	0	5.54000	0.292	1.24	0.686	1.3	1.8	NA	2016-06-10 to 2024-05-13
CCR-AP-6	Radium-226 & 228	pCi/L	20	1	5	10.20000	0.351	2.38	1.64	2.2	4.8	0.71 - 0.71	2016-06-10 to 2024-05-07
CCR-AP-7	Radium-226 & 228	pCi/L	21	0	0	1.72000	0.126	0.847	0.764	0.45	0.2	NA	2016-06-10 to 2024-05-10
CCR-AP-8	Radium-226 & 228	pCi/L	19	0	0	2.88000	0.449	1.44	1.43	0.65	0.42	NA	2017-03-09 to 2024-05-10
CCR-AP-9	Radium-226 & 228	pCi/L	19	0	0	12.60000	0.934	3.7	3.13	2.9	8.5	NA	2017-03-09 to 2024-05-08
CCR-AP-1R	Selenium, Total	mg/L	23	13	57	0.05000	0.00045	0.0111	0.005	0.015	0.00022	0.005 - 0.05	2016-06-10 to 2024-05-08
CCR-AP-2	Selenium, Total	mg/L	23	7	30	0.05000	0.00044	0.00856	0.005	0.011	0.00013	0.005 - 0.05	2016-06-10 to 2024-05-08
CCR-AP-3	Selenium, Total	mg/L	22	1	5	0.00680	0.00062	0.0022	0.00185	0.0013	1.7e-06	0.005 - 0.005	2016-06-10 to 2024-05-07
CCR-AP-4R	Selenium, Total	mg/L	22	11	50	0.03100	0.0009	0.00469	0.005	0.0061	3.7e-05	0.005 - 0.005	2016-06-10 to 2024-05-08
CCR-AP-5	Selenium, Total	mg/L	22	14	64	0.05000	0.00095	0.00729	0.005	0.01	0.0001	0.005 - 0.05	2016-06-10 to 2024-05-13
CCR-AP-6	Selenium, Total	mg/L	22	5	23	0.02500	0.001	0.00352	0.0019	0.005	2.5e-05	0.005 - 0.025	2016-06-10 to 2024-05-07
CCR-AP-7	Selenium, Total	mg/L	22	19	86	0.00500	0.00035	0.00449	0.005	0.0014	1.9e-06	0.005 - 0.005	2016-06-10 to 2024-05-10
CCR-AP-8	Selenium, Total	mg/L	22	3	14	0.00700	0.0014	0.00269	0.00195	0.0016	2.6e-06	0.005 - 0.005	2017-03-09 to 2024-05-10
CCR-AP-9	Selenium, Total	mg/L	21	15	71	0.05000	0.001	0.00871	0.005	0.011	0.00013	0.005 - 0.05	2017-03-09 to 2024-05-08
CCR-AP-1R	Thallium, Total	mg/L	23	7	30	0.00500	7.9e-05	0.00102	0.00094	0.0011	1.2e-06	0.001 - 0.005	2016-06-10 to 2024-05-08
CCR-AP-2	Thallium, Total	mg/L	23	3	13	0.00760	4.8e-05	0.00116	0.00086	0.0017	2.9e-06	0.001 - 0.005	2016-06-10 to 2024-05-08
CCR-AP-3	Thallium, Total	mg/L	22	21	95	0.00200	0.0001	0.001	0.001	0.00029	8.6e-08	0.001 - 0.002	2016-06-10 to 2024-05-07
CCR-AP-4R	Thallium, Total	mg/L	22	12	55	0.00500	6.1e-05	0.000854	0.001	0.0011	1.1e-06	0.001 - 0.005	2016-06-10 to 2024-05-08
CCR-AP-5	Thallium, Total	mg/L	22	15	68	0.01000	6.5e-05	0.00118	0.001	0.002	4e-06	0.001 - 0.01	2016-06-10 to 2024-05-13
CCR-AP-6	Thallium, Total	mg/L	22	14	64	0.00500	4.7e-05	0.00091	0.001	0.001	1.1e-06	0.001 - 0.005	2016-06-10 to 2024-05-07
CCR-AP-7	Thallium, Total	mg/L	24	20	83	0.00200	6.6e-05	0.00091	0.001	0.00039	1.5e-07	0.001 - 0.002	2016-06-10 to 2024-05-10
CCR-AP-8	Thallium, Total	mg/L	22	17	77	0.00200	5.8e-05	0.000848	0.001	0.00045	2.1e-07	0.001 - 0.002	2017-03-09 to 2024-05-10
CCR-AP-9	Thallium, Total	mg/L	21	12	57	0.01000	9.8e-05	0.00132	0.001	0.0022	5e-06	0.001 - 0.01	2017-03-09 to 2024-05-08

Note:

Units: mg/L = milligrams per liter, pCi/L = picocuries per liter

Table A-2. Results of Shapiro-Wilk Test for Normality

				Shapiro-Wilk Test for Normality (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit)			
Location	Constituent	n	n, non-detects	W statistic	p-value	Data Normality (significance level = 0.05)	Data Normality (significance level = 0.01)
CCR-AP-1R	Antimony, Total	23	6	0.6265	1.784e-06	Not normal	Not normal
CCR-AP-2	Antimony, Total	23	9	0.6888	1.006e-05	Not normal	Not normal
CCR-AP-3	Antimony, Total	22	17	0.4157	2.326e-08	Not normal	Not normal
CCR-AP-4R	Antimony, Total	22	15	0.3165	3.688e-09	Not normal	Not normal
CCR-AP-5	Antimony, Total	22	16	0.4493	4.54e-08	Not normal	Not normal
CCR-AP-6	Antimony, Total	22	9	0.3591	7.95e-09	Not normal	Not normal
CCR-AP-7	Antimony, Total	24	21	0.4676	2.773e-08	Not normal	Not normal
CCR-AP-8	Antimony, Total	22	6	0.5652	5.718e-07	Not normal	Not normal
CCR-AP-9	Antimony, Total	21	6	0.691	2.129e-05	Not normal	Not normal
CCR-AP-1R	Arsenic, Total	23	0	0.8961	0.021	Not normal	Normal
CCR-AP-2	Arsenic, Total	23	0	0.9125	0.0462	Not normal	Normal
CCR-AP-3	Arsenic, Total	22	0	0.9744	0.8093	Normal	Normal
CCR-AP-4R	Arsenic, Total	22	0	0.8037	0.0005726	Not normal	Not normal
CCR-AP-5	Arsenic, Total	21	2	0.5714	9.967e-07	Not normal	Not normal
CCR-AP-6	Arsenic, Total	22	0	0.8796	0.01186	Not normal	Normal
CCR-AP-7	Arsenic, Total	24	0	0.8692	0.005084	Not normal	Not normal
CCR-AP-8	Arsenic, Total	22	0	0.9174	0.06726	Normal	Normal
CCR-AP-9	Arsenic, Total	21	0	0.7604	0.000173	Not normal	Not normal
CCR-AP-1R	Barium, Total	23	0	0.8989	0.02394	Not normal	Normal
CCR-AP-2	Barium, Total	23	0	0.8889	0.01501	Not normal	Normal
CCR-AP-3	Barium, Total	22	0	0.9503	0.3198	Normal	Normal
CCR-AP-4R	Barium, Total	22	0	0.7588	0.0001211	Not normal	Not normal
CCR-AP-5	Barium, Total	22	0	0.7146	3.019e-05	Not normal	Not normal
CCR-AP-6	Barium, Total	22	0	0.9674	0.6512	Normal	Normal
CCR-AP-7	Barium, Total	24	0	0.9503	0.2751	Normal	Normal
CCR-AP-8	Barium, Total	22	0	0.9151	0.0602	Normal	Normal
CCR-AP-9	Barium, Total	21	0	0.7867	0.0004142	Not normal	Not normal
CCR-AP-1R	Beryllium, Total	23	0	0.8822	0.01104	Not normal	Normal
CCR-AP-2	Beryllium, Total	23	0	0.8159	0.0006964	Not normal	Not normal
CCR-AP-3	Beryllium, Total	22	21	0.2215	7.417e-10	Not normal	Not normal
CCR-AP-4R	Beryllium, Total	22	7	0.794	0.0004033	Not normal	Not normal
CCR-AP-5	Beryllium, Total	22	16	0.3849	1.285e-08	Not normal	Not normal
CCR-AP-6	Beryllium, Total	22	9	0.5777	7.704e-07	Not normal	Not normal
CCR-AP-7	Beryllium, Total	24	17	0.7544	5.779e-05	Not normal	Not normal
CCR-AP-8	Beryllium, Total	22	16	0.6549	5.496e-06	Not normal	Not normal
CCR-AP-9	Beryllium, Total	21	2	0.6582	8.678e-06	Not normal	Not normal
CCR-AP-1R	Cadmium, Total	23	13	0.625	1.719e-06	Not normal	Not normal
CCR-AP-2	Cadmium, Total	23	3	0.7746	0.0001545	Not normal	Not normal
CCR-AP-3	Cadmium, Total	22	21	0.2215	7.417e-10	Not normal	Not normal
CCR-AP-4R	Cadmium, Total	22	12	0.5325	2.694e-07	Not normal	Not normal
CCR-AP-5	Cadmium, Total	22	6	0.4708	7.068e-08	Not normal	Not normal
CCR-AP-6	Cadmium, Total	22	9	0.8129	0.0008008	Not normal	Not normal
CCR-AP-7	Cadmium, Total	24	22	0.41	8.382e-09	Not normal	Not normal
CCR-AP-8	Cadmium, Total	22	16	0.6608	6.456e-06	Not normal	Not normal
CCR-AP-9	Cadmium, Total	21	10	0.5865	1.424e-06	Not normal	Not normal
CCR-AP-1R	Chromium, Total	23	0	0.8898	0.01567	Not normal	Normal
CCR-AP-2	Chromium, Total	23	0	0.9044	0.0312	Not normal	Normal
CCR-AP-3	Chromium, Total	22	4	0.5175	1.927e-07	Not normal	Not normal
CCR-AP-4R	Chromium, Total	21	3	0.7448	0.0001054	Not normal	Not normal
CCR-AP-5	Chromium, Total	22	16	0.4236	2.715e-08	Not normal	Not normal
CCR-AP-6	Chromium, Total	22	1	0.8493	0.003296	Not normal	Not normal
CCR-AP-7	Chromium, Total	24	12	0.5935	5.231e-07	Not normal	Not normal
CCR-AP-8	Chromium, Total	21	2	0.7905	0.0004714	Not normal	Not normal
CCR-AP-9	Chromium, Total	21	0	0.5599	7.632e-07	Not normal	Not normal
CCR-AP-1R	Cobalt, Total	23	0	0.8723	0.007094	Not normal	Not normal
CCR-AP-2	Cobalt, Total	23	0	0.8126	0.0006138	Not normal	Not normal
CCR-AP-3	Cobalt, Total	22	0	0.9257	0.09982	Normal	Normal
CCR-AP-4R	Cobalt, Total	22	0	0.8527	0.003791	Not normal	Not normal
CCR-AP-5	Cobalt, Total	22	0	0.952	0.3465	Normal	Normal
CCR-AP-6	Cobalt, Total	22	0	0.9072	0.04147	Not normal	Normal
CCR-AP-7	Cobalt, Total	24	2	0.6018	6.475e-07	Not normal	Not normal
CCR-AP-8	Cobalt, Total	22	0	0.9632	0.5559	Normal	Normal
CCR-AP-9	Cobalt, Total	21	0	0.7025	2.961e-05	Not normal	Not normal

Location	Constituent	n	n, non-detects	Shapiro-Wilk Test for Normality (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit) W statistic	p-value	Data Normality (significance level = 0.05)	Data Normality (significance level = 0.01)
CCR-AP-1R	Fluoride	23	0	0.9213	0.07115	Normal	Normal
CCR-AP-2	Fluoride	23	0	0.9305	0.1119	Normal	Normal
CCR-AP-3	Fluoride	22	1	0.9465	0.2689	Normal	Normal
CCR-AP-4R	Fluoride	22	1	0.9542	0.3822	Normal	Normal
CCR-AP-5	Fluoride	22	0	0.8948	0.0234	Not normal	Normal
CCR-AP-6	Fluoride	22	0	0.9547	0.3907	Normal	Normal
CCR-AP-7	Fluoride	23	0	0.8706	0.006579	Not normal	Not normal
CCR-AP-8	Fluoride	22	1	0.7377	6.14e-05	Not normal	Not normal
CCR-AP-9	Fluoride	21	0	0.8795	0.01428	Not normal	Normal
CCR-AP-1R	Lead, Total	23	0	0.8885	0.01477	Not normal	Normal
CCR-AP-2	Lead, Total	23	0	0.8932	0.01834	Not normal	Normal
CCR-AP-3	Lead, Total	22	4	0.3698	9.685e-09	Not normal	Not normal
CCR-AP-4R	Lead, Total	22	1	0.7108	2.696e-05	Not normal	Not normal
CCR-AP-5	Lead, Total	22	13	0.4478	4.403e-08	Not normal	Not normal
CCR-AP-6	Lead, Total	22	0	0.7959	0.0004312	Not normal	Not normal
CCR-AP-7	Lead, Total	24	10	0.5745	3.247e-07	Not normal	Not normal
CCR-AP-8	Lead, Total	22	1	0.7999	0.0004983	Not normal	Not normal
CCR-AP-9	Lead, Total	21	0	0.8248	0.00161	Not normal	Not normal
CCR-AP-1R	Lithium, Total	23	0	0.8904	0.01611	Not normal	Normal
CCR-AP-2	Lithium, Total	23	5	0.8238	0.0009454	Not normal	Not normal
CCR-AP-3	Lithium, Total	22	18	0.6503	4.862e-06	Not normal	Not normal
CCR-AP-4R	Lithium, Total	22	6	0.8597	0.005068	Not normal	Not normal
CCR-AP-5	Lithium, Total	22	0	0.959	0.4688	Normal	Normal
CCR-AP-6	Lithium, Total	22	11	0.5415	3.306e-07	Not normal	Not normal
CCR-AP-7	Lithium, Total	24	0	0.6882	7.068e-06	Not normal	Not normal
CCR-AP-8	Lithium, Total	22	16	0.7121	2.802e-05	Not normal	Not normal
CCR-AP-9	Lithium, Total	21	0	0.7177	4.613e-05	Not normal	Not normal
CCR-AP-1R	Mercury, Total	22	22	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results
CCR-AP-2	Mercury, Total	22	13	0.605	1.504e-06	Not normal	Not normal
CCR-AP-3	Mercury, Total	21	21	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results
CCR-AP-4R	Mercury, Total	21	21	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results
CCR-AP-5	Mercury, Total	21	18	0.3882	2.203e-08	Not normal	Not normal
CCR-AP-6	Mercury, Total	21	19	0.4021	2.861e-08	Not normal	Not normal
CCR-AP-7	Mercury, Total	21	21	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results
CCR-AP-8	Mercury, Total	21	20	0.3451	1.004e-08	Not normal	Not normal
CCR-AP-9	Mercury, Total	20	20	NA	NA	Not Evaluated - All Non-Detect Results	Not Evaluated - All Non-Detect Results
CCR-AP-1R	Molybdenum, Total	23	0	0.8294	0.001176	Not normal	Not normal
CCR-AP-2	Molybdenum, Total	23	0	0.9418	0.1959	Normal	Normal
CCR-AP-3	Molybdenum, Total	22	0	0.7873	0.0003192	Not normal	Not normal
CCR-AP-4R	Molybdenum, Total	22	3	0.6477	4.534e-06	Not normal	Not normal
CCR-AP-5	Molybdenum, Total	22	0	0.9452	0.2524	Normal	Normal
CCR-AP-6	Molybdenum, Total	22	0	0.9466	0.2706	Normal	Normal
CCR-AP-7	Molybdenum, Total	24	1	0.763	7.748e-05	Not normal	Not normal
CCR-AP-8	Molybdenum, Total	22	0	0.9074	0.04182	Not normal	Normal
CCR-AP-9	Molybdenum, Total	21	2	0.7209	5.078e-05	Not normal	Not normal
CCR-AP-1R	Selenium, Total	23	13	0.656	3.959e-06	Not normal	Not normal
CCR-AP-2	Selenium, Total	23	7	0.709	1.835e-05	Not normal	Not normal
CCR-AP-3	Selenium, Total	22	1	0.5438	3.48e-07	Not normal	Not normal
CCR-AP-4R	Selenium, Total	22	11	0.3046	2.992e-09	Not normal	Not normal
CCR-AP-5	Selenium, Total	22	14	0.4949	1.178e-07	Not normal	Not normal
CCR-AP-6	Selenium, Total	22	5	0.5132	1.751e-07	Not normal	Not normal
CCR-AP-7	Selenium, Total	22	19	0.3932	1.504e-08	Not normal	Not normal
CCR-AP-8	Selenium, Total	22	3	0.6241	2.443e-06	Not normal	Not normal
CCR-AP-9	Selenium, Total	21	15	0.6062	2.291e-06	Not normal	Not normal
CCR-AP-1R	Thallium, Total	23	7	0.8031	0.0004302	Not normal	Not normal
CCR-AP-2	Thallium, Total	23	3	0.5188	1.303e-07	Not normal	Not normal
CCR-AP-3	Thallium, Total	22	21	0.4181	2.437e-08	Not normal	Not normal
CCR-AP-4R	Thallium, Total	22	12	0.6002	1.334e-06	Not normal	Not normal
CCR-AP-5	Thallium, Total	22	15	0.3699	9.697e-09	Not normal	Not normal
CCR-AP-6	Thallium, Total	22	14	0.5929	1.115e-06	Not normal	Not normal
CCR-AP-7	Thallium, Total	24	20	0.6096	7.913e-07	Not normal	Not normal

Location	Constituent	n	n, non-detects	Shapiro-Wilk Test for Normality (R programming, package = stats, version 4.3.3, function = shapiro.test, non-detects substituted by 0.5*reporting limit) W statistic	p-value	Data Normality (significance level = 0.05)	Data Normality (significance level = 0.01)
CCR-AP-8	Thallium, Total	22	17	0.698	1.845e-05	Not normal	Not normal
CCR-AP-9	Thallium, Total	21	12	0.5047	2.249e-07	Not normal	Not normal

Table A-3. Results of Rosner/Dixon Test for Outliers

				Rosner or Dixon Test for Outliers (R programming, package = outliers, version 0.15, function = dixon.test or rosnerTest, non-detects substituted by 0.5*reporting limit)					
Location	Constituent	n	n, non-detects	Outlier Test	statistic	p-value	Alternative Hypothesis	Statistical Outlier (significance level = 0.05)	Outlier Removed
CCR-AP-1R	Antimony, Total	23	6	Dixon	0.5302	0.01059	highest value 0.01 is an outlier	Yes	No
CCR-AP-2	Antimony, Total	23	9	Dixon	0.5476	0.004206	highest value 0.01 is an outlier	Yes	No
CCR-AP-3	Antimony, Total	22	17	Dixon	0.9662	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-4R	Antimony, Total	22	15	Dixon	0.9134	0	highest value 0.028 is an outlier	Yes	No
CCR-AP-5	Antimony, Total	22	16	Dixon	0.8111	0	highest value 0.01 is an outlier	Yes	No
CCR-AP-6	Antimony, Total	22	9	Dixon	0.9304	0	highest value 0.018 is an outlier	Yes	No
CCR-AP-7	Antimony, Total	24	21	Dixon	0.8982	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-8	Antimony, Total	22	6	Dixon	0.7729	0	highest value 0.0046 is an outlier	Yes	No
CCR-AP-9	Antimony, Total	21	6	Dixon	0.2278	0.9512	highest value 0.01 is an outlier	No	NA
CCR-AP-1R	Arsenic, Total	23	0	Dixon	0.1194	0.4373	highest value 0.038 is an outlier	No	NA
CCR-AP-2	Arsenic, Total	23	0	Dixon	0.3463	0.2847	highest value 0.048 is an outlier	No	NA
CCR-AP-3	Arsenic, Total	22	0	Dixon	0.4286	0.1023	lowest value 0.051 is an outlier	No	NA
CCR-AP-4R	Arsenic, Total	22	0	Dixon	0.4762	0.04417	highest value 0.33 is an outlier	Yes	No
CCR-AP-5	Arsenic, Total	21	2	Dixon	0.6319	0	highest value 0.024 is an outlier	Yes	No
CCR-AP-6	Arsenic, Total	22	0	Dixon	0.2714	0.6465	lowest value 0.04 is an outlier	No	NA
CCR-AP-7	Arsenic, Total	24	0	Dixon	0.5614	0	highest value 0.018 is an outlier	Yes	No
CCR-AP-8	Arsenic, Total	22	0	Dixon	0.4021	0.1522	lowest value 0.013 is an outlier	No	NA
CCR-AP-9	Arsenic, Total	21	0	Dixon	0.6415	0	highest value 0.032 is an outlier	Yes	No
CCR-AP-1R	Barium, Total	23	0	Dixon	0.2358	0.8196	highest value 0.59 is an outlier	No	NA
CCR-AP-2	Barium, Total	23	0	Dixon	0.3484	0.2777	highest value 0.83 is an outlier	No	NA
CCR-AP-3	Barium, Total	22	0	Dixon	0.1	0.31	highest value 0.49 is an outlier	No	NA
CCR-AP-4R	Barium, Total	22	0	Dixon	0.5455	0.00835	highest value 1.4 is an outlier	Yes	No
CCR-AP-5	Barium, Total	22	0	Dixon	0.4762	0.04417	highest value 0.2 is an outlier	Yes	No
CCR-AP-6	Barium, Total	22	0	Dixon	0.2308	0.8875	lowest value 0.43 is an outlier	No	NA
CCR-AP-7	Barium, Total	24	0	Dixon	0.3333	0.3081	highest value 0.19 is an outlier	No	NA
CCR-AP-8	Barium, Total	22	0	Dixon	0.2632	0.693	lowest value 0.27 is an outlier	No	NA
CCR-AP-9	Barium, Total	21	0	Dixon	0.6226	0	highest value 0.72 is an outlier	Yes	No
CCR-AP-1R	Beryllium, Total	23	0	Dixon	0.1637	0.7129	highest value 0.0066 is an outlier	No	NA
CCR-AP-2	Beryllium, Total	23	0	Dixon	0.3794	0.1859	highest value 0.0077 is an outlier	No	NA
CCR-AP-3	Beryllium, Total	22	21	Dixon	1	0	highest value 0.00056 is an outlier	Yes	No
CCR-AP-4R	Beryllium, Total	22	7	Dixon	0.3922	0.1746	highest value 0.0017 is an outlier	No	NA
CCR-AP-5	Beryllium, Total	22	16	Dixon	0.8918	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-6	Beryllium, Total	22	9	Dixon	0.7974	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-7	Beryllium, Total	24	17	Dixon	0.1917	0.9362	lowest value 0.000067 is an outlier	No	NA
CCR-AP-8	Beryllium, Total	22	16	Dixon	0.1765	0.7648	lowest value 0.00016 is an outlier	No	NA
CCR-AP-9	Beryllium, Total	21	2	Dixon	0.7064	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-1R	Cadmium, Total	23	13	Dixon	0.523	0.01304	highest value 0.005 is an outlier	Yes	No
CCR-AP-2	Cadmium, Total	23	3	Dixon	0.5788	0	highest value 0.0066 is an outlier	Yes	No
CCR-AP-3	Cadmium, Total	22	21	Dixon	1	0	lowest value 0.00038 is an outlier	Yes	No
CCR-AP-4R	Cadmium, Total	22	12	Dixon	0.7716	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-5	Cadmium, Total	22	6	Dixon	0.7851	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-6	Cadmium, Total	22	9	Dixon	0.6304	0	highest value 0.0011 is an outlier	Yes	No
CCR-AP-7	Cadmium, Total	24	22	Dixon	0.5	0.01865	lowest value 0.00014 is an outlier	Yes	No
CCR-AP-8	Cadmium, Total	22	16	Dixon	0.08824	0.2487	lowest value 0.00016 is an outlier	No	NA
CCR-AP-9	Cadmium, Total	21	10	Dixon	0.5112	0.02629	highest value 0.005 is an outlier	Yes	No
CCR-AP-1R	Chromium, Total	23	0	Dixon	0.2667	0.6398	highest value 0.16 is an outlier	No	NA
CCR-AP-2	Chromium, Total	23	0	Dixon	0.2935	0.5017	highest value 0.14 is an outlier	No	NA
CCR-AP-3	Chromium, Total	22	4	Dixon	0.7615	0	highest value 0.014 is an outlier	Yes	No
CCR-AP-4R	Chromium, Total	21	3	Dixon	0.5329	0.01637	highest value 0.058 is an outlier	Yes	No
CCR-AP-5	Chromium, Total	22	16	Dixon	0.8364	0	highest value 0.056 is an outlier	Yes	No
CCR-AP-6	Chromium, Total	22	1	Dixon	0.3474	0.3069	highest value 0.043 is an outlier	No	NA
CCR-AP-7	Chromium, Total	24	12	Dixon	0.7167	0	highest value 0.019 is an outlier	Yes	No
CCR-AP-8	Chromium, Total	21	2	Dixon	0.5635	0.005373	highest value 0.014 is an outlier	Yes	No
CCR-AP-9	Chromium, Total	21	0	Dixon	0.7436	0	highest value 0.15 is an outlier	Yes	No
CCR-AP-1R	Cobalt, Total	23	0	Dixon	0.07989	0.2227	highest value 0.081 is an outlier	No	NA
CCR-AP-2	Cobalt, Total	23	0	Dixon	0.5375	0.007963	highest value 0.091 is an outlier	Yes	No
CCR-AP-3	Cobalt, Total	22	0	Dixon	0 28	0.6	highest value 0.0094 is an outlier	No	NA
CCR-AP-4R	Cobalt, Total	22	0	Dixon	0.4145	0.127	highest value 0.021 is an outlier	No	NA
CCR-AP-5	Cobalt, Total	22	0	Dixon	0.327	0.3838	highest value 0.01 is an outlier	No	NA
CCR-AP-6	Cobalt, Total	22	0	Dixon	0.3311	0.3674	highest value 0.019 is an outlier	No	NA
CCR-AP-7	Cobalt, Total	24	2	Dixon	0.6594	0	highest value 0.015 is an outlier	Yes	No

Rosner or Dixon Test for Outliers (R programming, package = outliers, version 0.15, function = dixon.test or rosnerTest, non-detects substituted by 0.5*reporting limit)

Location	Constituent	n	n, non-detects	Outlier Test	statistic	p-value	Alternative Hypothesis	Statistical Outlier (significance level = 0.05)	Outlier Removed
CCR-AP-8	Cobalt, Total	22	0	Dixon	0.3623	0.2572	highest value 0.017 is an outlier	No	NA
CCR-AP-9	Cobalt, Total	21	0	Dixon	0.7035	0	highest value 0.047 is an outlier	Yes	No
CCR-AP-1R	Fluoride	23	0	Dixon	0.5349	0.008932	highest value 0.81 is an outlier	Yes	No
CCR-AP-2	Fluoride	23	0	Dixon	0.3043	0.451	highest value 0.69 is an outlier	No	NA
CCR-AP-3	Fluoride	22	1	Dixon	0.5	0.02699	highest value 0.93 is an outlier	Yes	No
CCR-AP-4R	Fluoride	22	1	Dixon	0.5106	0.02152	lowest value 0.05 is an outlier	Yes	No
CCR-AP-5	Fluoride	22	0	Dixon	0.2055	0.9516	highest value 2.3 is an outlier	No	NA
CCR-AP-6	Fluoride	22	0	Dixon	0.2791	0.605	lowest value 0.24 is an outlier	No	NA
CCR-AP-7	Fluoride	23	0	Dixon	0.46	0.05099	highest value 0.72 is an outlier	No	NA
CCR-AP-8	Fluoride	22	1	Dixon	0.7473	0	highest value 1.1 is an outlier	Yes	No
CCR-AP-9	Fluoride	21	0	Dixon	0.48	0.05	lowest value 0.14 is an outlier	No	NA
CCR-AP-1R	Lead, Total	23	0	Dixon	0.2064	0.9962	highest value 0.094 is an outlier	No	NA
CCR-AP-2	Lead, Total	23	0	Dixon	0.4527	0.05866	highest value 0.1 is an outlier	No	NA
CCR-AP-3	Lead, Total	22	4	Dixon	0.8912	0	highest value 0.01 is an outlier	Yes	No
CCR-AP-4R	Lead, Total	22	1	Dixon	0.5714	0	highest value 0.047 is an outlier	Yes	No
CCR-AP-5	Lead, Total	22	13	Dixon	0.7572	0	highest value 0.02 is an outlier	Yes	No
CCR-AP-6	Lead, Total	22	0	Dixon	0.5276	0.01459	highest value 0.041 is an outlier	Yes	No
CCR-AP-7	Lead, Total	24	10	Dixon	0.6051	0	highest value 0.02 is an outlier	Yes	No
CCR-AP-8	Lead, Total	22	1	Dixon	0.6125	0	highest value 0.0076 is an outlier	Yes	No
CCR-AP-9	Lead, Total	21	0	Dixon	0.4683	0.06241	highest value 0.041 is an outlier	No	NA
CCR-AP-1R	Lithium, Total	23	0	Dixon	0.3608	0.2379	highest value 0.23 is an outlier	No	NA
CCR-AP-2	Lithium, Total	23	5	Dixon	0.3704	0.2099	highest value 0.125 is an outlier	No	NA
CCR-AP-3	Lithium, Total	22	18	Dixon	0	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-4R	Lithium, Total	22	6	Dixon	0.4989	0.02764	highest value 0.047 is an outlier	Yes	No
CCR-AP-5	Lithium, Total	22	0	Dixon	0.1844	0.8154	lowest value 0.009 is an outlier	No	NA
CCR-AP-6	Lithium, Total	22	11	Dixon	0.8163	0	highest value 0.125 is an outlier	Yes	No
CCR-AP-7	Lithium, Total	24	0	Dixon	0.6355	0	highest value 0.039 is an outlier	Yes	No
CCR-AP-8	Lithium, Total	22	16	Dixon	0	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-9	Lithium, Total	21	0	Dixon	0.6437	0	highest value 0.12 is an outlier	Yes	No
CCR-AP-1R	Mercury, Total	22	22	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-2	Mercury, Total	22	13	Dixon	0.541	0.01001	highest value 0.00071 is an outlier	Yes	No
CCR-AP-3	Mercury, Total	21	21	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-4R	Mercury, Total	21	21	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-5	Mercury, Total	21	18	Dixon	0.8533	0	highest value 0.0016 is an outlier	Yes	No
CCR-AP-6	Mercury, Total	21	19	Dixon	0.7742	0	highest value 0.00041 is an outlier	Yes	No
CCR-AP-7	Mercury, Total	21	21	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-8	Mercury, Total	21	20	Dixon	1	0	highest value 0.00026 is an outlier	Yes	No
CCR-AP-9	Mercury, Total	20	20	Dixon	NA	NA	Not Evlauated - All results are non-detect	NA	NA
CCR-AP-1R	Molybdenum, Total	23	0	Dixon	0.565	0	highest value 0.023 is an outlier	Yes	No
CCR-AP-2	Molybdenum, Total	23	0	Dixon	0.2558	0.7009	highest value 0.01 is an outlier	No	NA
CCR-AP-3	Molybdenum, Total	22	0	Dixon	0.6145	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-4R	Molybdenum, Total	22	3	Dixon	0.4605	0.05997	highest value 0.017 is an outlier	No	NA
CCR-AP-5	Molybdenum, Total	22	0	Dixon	0.359	0.2679	highest value 0.53 is an outlier	No	NA
CCR-AP-6	Molybdenum, Total	22	0	Dixon	0.4	0.1567	highest value 0.043 is an outlier	No	NA
CCR-AP-7	Molybdenum, Total	24	1	Dixon	0.4138	0.09869	highest value 0.013 is an outlier	No	NA
CCR-AP-8	Molybdenum, Total	22	0	Dixon	0.4712	0.04883	highest value 0.029 is an outlier	Yes	No
CCR-AP-9	Molybdenum, Total	21	2	Dixon	0.6222	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-1R	Radium-226 & 228	21	0	Dixon	0.5301	0.01745	highest value 14.4 is an outlier	Yes	No
CCR-AP-2	Radium-226 & 228	21	0	Dixon	0.47	0.06051	highest value 5.53 is an outlier	No	NA
CCR-AP-3	Radium-226 & 228	20	0	Dixon	0.4608	0.08453	highest value 4.87 is an outlier	No	NA
CCR-AP-4R	Radium-226 & 228	20	0	Dixon	0.8934	0	highest value 30 is an outlier	Yes	No
CCR-AP-5	Radium-226 & 228	20	0	Dixon	0.5277	0.0234	highest value 5.54 is an outlier	Yes	No
CCR-AP-6	Radium-226 & 228	20	1	Dixon	0.7758	0	highest value 10.2 is an outlier	Yes	No
CCR-AP-7	Radium-226 & 228	21	0	Dixon	0.2152	0.9709	highest value 1.72 is an outlier	No	NA
CCR-AP-8	Radium-226 & 228	19	0	Dixon	0.3621	0.3545	highest value 2.88 is an outlier	No	NA
CCR-AP-9	Radium-226 & 228	19	0	Dixon	0.5544	0.01698	highest value 12.6 is an outlier	Yes	No
CCR-AP-1R	Selenium, Total	23	13	Dixon	0	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-2	Selenium, Total	23	7	Dixon	0.4049	0.1288	highest value 0.026 is an outlier	No	NA
CCR-AP-3	Selenium, Total	22	1	Dixon	0.8269	0	highest value 0.0068 is an outlier	Yes	No
CCR-AP-4R	Selenium, Total	22	11	Dixon	0.9532	0	highest value 0.031 is an outlier	Yes	No
CCR-AP-5	Selenium, Total	22	14	Dixon	0.7729	0	highest value 0.025 is an outlier	Yes	No
CCR-AP-6	Selenium, Total	22	5	Dixon	0.8407	0	highest value 0.0125 is an outlier	Yes	No
CCR-AP-7	Selenium, Total	22	19	Dixon	1	0	lowest value 0.00035 is an outlier	Yes	No
CCR-AP-8	Selenium, Total	22	3	Dixon	0.6909	0	highest value 0.007 is an outlier	Yes	No

Rosner or Dixon Test for Outliers (R programming, package = outliers, version 0.15, function = dixon.test or rosnerTest, non-detects substituted by 0.5*reporting limit)

Location	Constituent	n	n, non-detects	Outlier Test	statistic	p-value	Alternative Hypothesis	Statistical Outlier (significance level = 0.05)	Outlier Removed
CCR-AP-9	Selenium, Total	21	15	Dixon	0.5297	0.01762	highest value 0.025 is an outlier	Yes	No
CCR-AP-1R	Thallium, Total	23	7	Dixon	0.4977	0.02342	highest value 0.0027 is an outlier	Yes	No
CCR-AP-2	Thallium, Total	23	3	Dixon	0.8445	0	highest value 0.0076 is an outlier	Yes	No
CCR-AP-3	Thallium, Total	22	21	Dixon	1	0	highest value 0.001 is an outlier	Yes	No
CCR-AP-4R	Thallium, Total	22	12	Dixon	0.8207	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-5	Thallium, Total	22	15	Dixon	0.9298	0	highest value 0.005 is an outlier	Yes	No
CCR-AP-6	Thallium, Total	22	14	Dixon	0.8299	0	highest value 0.0025 is an outlier	Yes	No
CCR-AP-7	Thallium, Total	24	20	Dixon	0.5482	0.00102	highest value 0.001 is an outlier	Yes	No
CCR-AP-8	Thallium, Total	22	17	Dixon	0.5453	0.008424	highest value 0.001 is an outlier	Yes	No
CCR-AP-9	Thallium, Total	21	12	Dixon	0.8221	0	highest value 0.005 is an outlier	Yes	No

Table A-4. Results of Mann Kendall and Thiel Sen Trend Tests

		Mann Kendall Trends			Secular Trend Evaluation for All Data									Secular Trend Evaluation for Recent Data (subset of 8 most recent data points)								
					Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)		Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)								Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)	
Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
CCR-AP-1R	Antimony, Total	No Trend	Probably Decreasing	No	23	17	1.19	0.0647	0.69	31	16	0.000005	0.69	8	8	2021-05-13 to 2024-05-08	0.688	-0.571	0.0635	93.7	-16	-0.000243	0.0635
CCR-AP-2	Antimony, Total	No Trend	No Trend	No	23	14	1.06	0.205	0.191	80.9	50	0.0000158	0.191	8	8	2021-05-12 to 2024-05-08	1.02	0.109	0.803	19.7	3	0.0000485	0.803
CCR-AP-3	Antimony, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	22	5	0.77	NA	NA	NA	NA	NA	NA	8	3	2020-11-13 to 2024-05-07	0.878	NA	NA	NA	NA	NA	NA
CCR-AP-4R	Antimony, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	22	7	2.31	NA	NA	NA	NA	NA	NA	8	5	2020-11-13 to 2024-05-08	1.99	-0.0378	1	0	-1	0	1
CCR-AP-5	Antimony, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	22	6	1.33	NA	NA	NA	NA	NA	NA	8	5	2020-11-13 to 2024-05-13	0.916	0.491	0.126	87.4	13	0.000114	0.126
CCR-AP-6	Antimony, Total	No Trend	No Trend	No	22	13	1.99	0.033	0.861	13.9	7	0	0.861	8	6	2020-11-13 to 2024-05-07	1.96	0.0378	1	0	1	0	1
CCR-AP-7	Antimony, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	24	3	0.367	NA	NA	NA	NA	NA	NA	8	0	2020-11-12 to 2024-05-10	0.447	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Antimony, Total	Stable	No Trend	No	22	16	0.825	-0.246	0.128	87.2	-54	-0.0000192	0.128	8	7	2020-11-12 to 2024-05-10	1.11	-0.286	0.386	61.4	-8	-0.0000689	0.386
CCR-AP-9	Antimony, Total	No Trend	No Trend	No	21	15	1.09	-0.0488	0.785	21.5	-10	-0.00000294	0.785	8	6	2020-05-19 to 2024-05-08	1.18	-0.214	0.536	46.4	-6	-0.000108	0.536
Pooled Background	Antimony, Total	No Trend	Stable	No	68	35	1.22	0.12	0.173	82.7	249	0	0.173	8	5	2023-05-23 to 2024-05-10	0.485	-0.109	0.803	19.7	-3	-0.0000225	0.803
CCR-AP-1R	Arsenic, Total	Increasing	Decreasing	No	23	23	0.708	0.329	0.0302	97	83	0.000577	0.0302	8	8	2021-05-13 to 2024-05-08	0.485	-0.643	0.0354	96.5	-18	-0.00287	0.0354
CCR-AP-2	Arsenic, Total	Increasing	Increasing	No	23	23	0.798	0.618	0.0000465	100	155	0.00133	0.0000464	8	8	2021-05-12 to 2024-05-08	0.59	0.643	0.0354	96.5	18	0.005	0.0354
CCR-AP-3	Arsenic, Total	Probably Increasing	Stable	No	22	22	0.134	0.271	0.0883	91.2	61	0.000625	0.0883	8	8	2020-11-13 to 2024-05-07	0.166	-0.265	0.445	55.5	-7	-0.00213	0.445
CCR-AP-4R	Arsenic, Total	Increasing	Stable	No	22	22	0.728	0.403	0.0101	99	92	0.00529	0.0101	8	8	2020-11-13 to 2024-05-08	0.664	-0.143	0.711	28.9	-4	-0.00778	0.711
CCR-AP-5	Arsenic, Total	Increasing	No Trend	No	21	19	1.71	0.465	0.0037	99.6	97	0.00014	0.0037	8	8	2020-11-13 to 2024-05-13	1.05	0.4	0.212	78.8	11	0.00165	0.212
CCR-AP-6	Arsenic, Total	Probably Increasing	Stable	No	22	22	0.243	0.292	0.0711	92.9	64	0.00171	0.0711	8	8	2020-11-13 to 2024-05-07	0.189	-0.309	0.369	63.1	-8	-0.00117	0.369
CCR-AP-7	Arsenic, Total	Decreasing	Stable	No	24	24	0.733	-0.401	0.00678	99.3	-110	-0.000242	0.00678	8	8	2020-11-12 to 2024-05-10	0.743	-0.327	0.319	68.1	-9	-0.000525	0.319
CCR-AP-8	Arsenic, Total	Increasing	Decreasing	No	22	22	0.311	0.426	0.00706	99.3	96	0.0023	0.00706	8	8	2020-11-12 to 2024-05-10	0.395	-0.718	0.0226	97.7	-19	-0.00958	0.0226
CCR-AP-9	Arsenic, Total	No Trend	Stable	No	21	21	0.623	0.129	0.432	56.8	27	0.000129	0.432	8	8	2020-05-19 to 2024-05-08	0.521	-0.429	0.174	82.6	-12	-0.00142	0.174
Pooled Background	Arsenic, Total	No Trend	Probably Decreasing	No	68	68	0.845	0.0776	0.354	64.6	176	0.0000305	0.354	8	8	2023-05-23 to 2024-05-10	0.742	-0.571	0.0635	93.7	-16	-0.00169	0.0635
CCR-AP-1R	Barium, Total	Increasing	Stable	No	23	23	0.662	0.341	0.0247	97.5	86	0.00909	0.0247	8	8	2021-05-13 to 2024-05-08	0.268	-0.0714	0.902	9.8	-2	-0.00667	0.902
CCR-AP-2	Barium, Total	Increasing	Increasing	No	23	23	0.746	0.485	0.00138	99.9	122	0.0186	0.00138	8	8	2021-05-12 to 2024-05-08	0.678	1	0.000837	99.9	28	0.105	0.000837
CCR-AP-3	Barium, Total	No Trend	Stable	No	22	22	0.0764	0.147	0.364	63.6	33	0.00125	0.364	8	8	2020-11-13 to 2024-05-07	0 0905	-0.286	0.386	61.4	-8	-0.00633	0.386
CCR-AP-4R	Barium, Total	No Trend	Stable	No	22	22	0.35	0.0132	0.955	4.5	3	0	0.955	8	8	2020-11-13 to 2024-05-08	0.424	-0.0364	1	0	-1	-0.005	1
CCR-AP-5	Barium, Total	Increasing	No Trend	No	22	22	0.716	0.575	0.000217	100	132	0.00312	0.000217	8	8	2020-11-13 to 2024-05-13	0.583	0.214	0.536	46.4	6	0.00945	0.536
CCR-AP-6	Barium, Total	Stable	Decreasing	No	22	22	0.126	-0.238	0.133	86.7	-54	-0.004	0.133	8	8	2020-11-13 to 2024-05-07	0.143	-0.691	0.0248	97.5	-19	-0.0167	0.0248
CCR-AP-7	Barium, Total	Decreasing	Stable	No	24	24	0.226	-0.397	0.00921	99.1	-105	-0.00226	0.00921	8	8	2020-11-12 to 2024-05-10	0.161	-0.189	0.61	39	-5	-0.00367	0.61
CCR-AP-8	Barium, Total	Decreasing	Decreasing	No	22	22	0.207	-0.543	0.00051	99.9	-124	-0.0114	0.00051	8	8	2020-11-12 to 2024-05-10	0.25	-0.764	0.0126	98.7	-21	-0.0367	0.0126
CCR-AP-9	Barium, Total	No Trend	Stable	No	21	21	0.424	0.223	0.172	82.8	46	0.00481	0.172	8	8	2020-05-19 to 2024-05-08	0.324	-0.255	0.454	54.6	-7	-0.0138	0.454
Pooled Background	Barium, Total	Probably Increasing	Stable	No	68	68	0.615	0.148	0.0785	92.2	333	0.00102	0.0785	8	8	2023-05-23 to 2024-05-10	0.436	-0.182	0.618	38.2	-5	-0.00875	0.618
CCR-AP-1R	Beryllium, Total	Increasing	Decreasing	No	23	23	0.82	0.36	0.0175	98.2	91	0.000138	0.0175	8	8	2021-05-13 to 2024-05-08	0.504	-0.643	0.0354	96.5	-18	-0.000662	0.0354
CCR-AP-2	Beryllium, Total	Increasing	No Trend	No	23	23	0.94	0.583	0.000114	100	147	0.000162	0.000114	8	8	2021-05-12 to 2024-05-08	0.683	0.286	0.386	61.4	8	0.000532	0.386
CCR-AP-3	Beryllium, Total	Not Evaluated - Only one detected result.	Not Evaluated - Only one detected result.	No	22	1	0.0254	NA	NA	NA	NA	NA	NA	8	1	2020-11-13 to 2024-05-07	0 0418	NA	NA	NA	NA	NA	NA
CCR-AP-4R	Beryllium, Total	Increasing	Stable	No	22	15	0.699	0.427	0.00759	99.2	94	0.0000169	0.00759	8	4	2020-11-13 to 2024-05-08	0.62	-0.403	0.232	76.8	-10	-0.0000129	0.232
CCR-AP-5	Beryllium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Only one detected result.	No	22	6	1.32	NA	NA	NA	NA	NA	NA	8	1	2020-11-13 to 2024-05-13	0.61	NA	NA	NA	NA	NA	NA
CCR-AP-6	Beryllium, Total	No Trend	Not Evaluated - Majority of data (>50%) non-detect.	No	22	13	0.925	0.232	0.151	84.9	51	0.000008	0.151	8	2	2020-11-13 to 2024-05-07	0.452	NA	NA	NA	NA	NA	NA

Note:
Mann Kendall Trends are classified based on Aziz (2003) guidance.

		Mann Kendall Trends			Secular Trend Evaluation for All Data									Secular Trend Evaluation for Recent Data (subset of 8 most recent data points)								
					Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)		Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)								Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)	
Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
CCR-AP-7	Beryllium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	24	7	0.404	NA	NA	NA	NA	NA	NA	8	0	2020-11-12 to 2024-05-10	0.189	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Beryllium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Only one detected result.	No	22	6	0.295	NA	NA	NA	NA	NA	NA	8	1	2020-11-12 to 2024-05-10	0.237	NA	NA	NA	NA	NA	NA
CCR-AP-9	Beryllium, Total	Probably Increasing	Stable	No	21	19	1.02	0.279	0.0846	91.5	58	0.0000314	0.0846	8	6	2020-05-19 to 2024-05-08	0.971	-0.286	0.386	61.4	-8	-0.000113	0.386
Pooled Background	Beryllium, Total	Increasing	Stable	No	68	49	1.2	0.232	0.00658	99.3	510	0.00000879	0.00658	8	5	2023-05-23 to 2024-05-10	0.801	-0.327	0.319	68.1	-9	-0.000212	0.319
CCR-AP-1R	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	23	10	1.32	NA	NA	NA	NA	NA	NA	8	6	2021-05-13 to 2024-05-08	1.27	-0.286	0.386	61.4	-8	-0.0000425	0.386
CCR-AP-2	Cadmium, Total	Increasing	No Trend	No	23	20	0.997	0.421	0.0055	99.5	106	0.0000625	0.0055	8	8	2021-05-12 to 2024-05-08	0.964	0.429	0.174	82.6	12	0.000237	0.174
CCR-AP-3	Cadmium, Total	Not Evaluated - Only one detected result.	Not Evaluated - Only one detected result.	No	22	1	0.0517	NA	NA	NA	NA	NA	NA	8	1	2020-11-13 to 2024-05-07	0 0875	NA	NA	NA	NA	NA	NA
CCR-AP-4R	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Stable	No	22	10	0.901	NA	NA	NA	NA	NA	NA	8	4	2020-11-13 to 2024-05-08	0.309	0	1	0	0	0	1
CCR-AP-5	Cadmium, Total	No Trend	No Trend	No	22	16	1.4	0.0934	0.57	43	21	0.00000455	0.57	8	5	2020-11-13 to 2024-05-13	0.559	0.189	0.61	39	5	0.0000246	0.61
CCR-AP-6	Cadmium, Total	No Trend	Not Evaluated - Majority of data (>50%) non-detect.	No	22	13	0.485	0.183	0.272	72.8	38	0	0.272	8	2	2020-11-13 to 2024-05-07	0.52	NA	NA	NA	NA	NA	NA
CCR-AP-7	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	24	2	0.199	NA	NA	NA	NA	NA	NA	8	0	2020-11-12 to 2024-05-10	0.189	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	22	6	0.3	NA	NA	NA	NA	NA	NA	8	3	2020-11-12 to 2024-05-10	0.339	NA	NA	NA	NA	NA	NA
CCR-AP-9	Cadmium, Total	Increasing	Not Evaluated - Majority of data (>50%) non-detect.	No	21	11	1.6	0.484	0.00325	99.7	97	0.0000226	0.00325	8	2	2020-05-19 to 2024-05-08	1.59	NA	NA	NA	NA	NA	NA
Pooled Background	Cadmium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	68	23	1.45	NA	NA	NA	NA	NA	NA	8	3	2023-05-23 to 2024-05-10	0.353	NA	NA	NA	NA	NA	NA
CCR-AP-1R	Chromium, Total	Increasing	Stable	No	23	23	0.841	0.326	0.0322	96.8	82	0.00236	0.0322	8	8	2021-05-13 to 2024-05-08	0.436	-0.429	0.174	82.6	-12	-0.00746	0.174
CCR-AP-2	Chromium, Total	Increasing	Increasing	No	23	23	0.839	0.589	0.0000927	100	149	0.00423	0.0000928	8	8	2021-05-12 to 2024-05-08	0.691	0.929	0.00198	99.8	26	0.0176	0 00198
CCR-AP-3	Chromium, Total	Probably Increasing	No Trend	No	22	18	0.951	0.276	0.0868	91.3	61	0.00005	0.0868	8	7	2020-11-13 to 2024-05-07	1.1	0.4	0.212	78.8	11	0.000225	0.212
CCR-AP-4R	Chromium, Total	No Trend	Stable	Yes	21	18	0.89	0.249	0.123	87.7	52	0.000267	0.123	8	7	2020-11-13 to 2024-05-08	0.87	-0.0714	0.902	9.8	-2	-0.000137	0.902
CCR-AP-5	Chromium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	22	6	2.28	NA	NA	NA	NA	NA	NA	8	5	2020-11-13 to 2024-05-13	1.6	0.416	0.203	79.7	11	0.000875	0.203
CCR-AP-6	Chromium, Total	Stable	No Trend	No	22	21	0.862	-0.166	0.296	70.4	-38	-0.000237	0.296	8	7	2020-11-13 to 2024-05-07	1.44	-0.214	0.536	46.4	-6	-0.00066	0.536
CCR-AP-7	Chromium, Total	No Trend	Not Evaluated - No detected results.	No	24	12	1.26	0.0579	0.723	27.7	15	0	0.723	8	0	2020-11-12 to 2024-05-10	0.679	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Chromium, Total	No Trend	Stable	No	21	19	0.832	0.0383	0.832	16.8	8	0.0000161	0.832	8	7	2020-11-12 to 2024-05-10	0.979	-0.143	0.711	28.9	-4	-0.000237	0.711
CCR-AP-9	Chromium, Total	Increasing	Stable	No	21	21	1.22	0.36	0.0252	97.5	75	0.000926	0.0252	8	8	2020-05-19 to 2024-05-08	0.594	-0.109	0.803	19.7	-3	-0.000571	0.803
Pooled Background	Chromium, Total	Probably Increasing	Stable	No	68	56	1.39	0.164	0.0511	94.9	369	0.000156	0.0511	8	6	2023-05-23 to 2024-05-10	0.877	-0.429	0.174	82.6	-12	-0.00456	0.174
CCR-AP-1R	Cobalt, Total	Increasing	Probably Decreasing	No	23	23	0.828	0.369	0.015	98.5	93	0.00169	0.015	8	8	2021-05-13 to 2024-05-08	0.542	-0.571	0.0635	93.7	-16	-0.0058	0.0635
CCR-AP-2	Cobalt, Total	Increasing	Increasing	No	23	23	0.695	0.644	0.0000207	100	162	0.0017	0.0000208	8	8	2021-05-12 to 2024-05-08	0.626	0.714	0.0187	98.1	20	0.00704	0.0187
CCR-AP-3	Cobalt, Total	Decreasing	No Trend	No	22	22	0.255	-0.515	0.000877	99.9	-119	-0.000175	0.000877	8	8	2020-11-13 to 2024-05-07	0.318	0.286	0.386	61.4	8	0.000236	0.386
CCR-AP-4R	Cobalt, Total	No Trend	Stable	Yes	22	22	0.626	0.0607	0.714	28.6	14	0.0000243	0.714	8	8	2020-11-13 to 2024-05-08	0.67	-0.0714	0.902	9.8	-2	-0.000189	0.902
CCR-AP-5	Cobalt, Total	Decreasing	No Trend	No	22	22	0.64	-0.485	0.00189	99.8	-111	-0.00032	0.00189	8	8	2020-11-13 to 2024-05-13	1.06	0.4	0.212	78.8	11	0.000558	0.212
CCR-AP-6	Cobalt, Total	Stable	Stable	No	22	22	0.522	-0.252	0.108	89.2	-58	-0.00022	0.108	8	8	2020-11-13 to 2024-05-07	0.781	-0.4	0.212	78.8	-11	-0.000417	0.212
CCR-AP-7	Cobalt, Total	Decreasing	No Trend	No	24	22	1.51	-0.404	0.00631	99.4	-111	-0.0000848	0.00631	8	6	2020-11-12 to 2024-05-10	0.561	0.214	0.536	46.4	6	0.0000247	0.536
CCR-AP-8	Cobalt, Total	Decreasing	Stable	No	22	22	0.451	-0.595	0.000149	100	-135	-0.000467	0.000149	8	8	2020-11-12 to 2024-05-10	0.542	-0.286	0.386	61.4	-8	-0.000658	0.386
CCR-AP-9	Cobalt, Total	No Trend	Stable	No	21	21	0.574	0.234	0.153	84.7	48	0.00025	0.153	8	8	2020-05-19 to 2024-05-08	0.385	-0.265	0.445	55.5	-7	-0.001	0.445

Note:
Mann Kendall Trends are classified based on Aziz (2003) guidance.

		Mann Kendall Trends			Secular Trend Evaluation for All Data									Secular Trend Evaluation for Recent Data (subset of 8 most recent data points)								
					Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)		Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)	
Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
Pooled Background	Cobalt, Total	No Trend	Probably Decreasing	No	68	66	1.25	0.0915	0.275	72.5	207	0.0000667	0.275	8	7	2023-05-23 to 2024-05-10	0.893	-0.571	0.0635	93.7	-16	-0.0035	0.0635
CCR-AP-1R	Fluoride	Decreasing	Decreasing	No	23	23	0.217	-0.485	0.00158	99.8	-120	-0.00818	0.00158	8	8	2021-05-13 to 2024-05-08	0.245	-0.909	0.00277	99.7	-25	-0.0314	0 00277
CCR-AP-2	Fluoride	Increasing	Stable	No	23	23	0.414	0.487	0.00136	99.9	122	0.0143	0.00136	8	8	2021-05-12 to 2024-05-08	0.28	-0.327	0.319	68.1	-9	-0.0357	0.319
CCR-AP-3	Fluoride	Stable	Stable	No	22	21	0.474	-0.209	0.185	81.5	-48	-0.00933	0.185	8	8	2020-11-13 to 2024-05-07	0.403	-0.143	0.711	28.9	-4	-0.0104	0.711
CCR-AP-4R	Fluoride	No Trend	Probably Increasing	No	22	21	0.324	0.227	0.15	85	52	0.00667	0.15	8	8	2020-11-13 to 2024-05-08	0.265	0.571	0.0635	93.7	16	0.0383	0.0635
CCR-AP-5	Fluoride	Increasing	Stable	No	22	22	0.354	0.419	0.00782	99.2	95	0.0429	0.00782	8	8	2020-11-13 to 2024-05-13	0.371	0	1	0	0	0	1
CCR-AP-6	Fluoride	Stable	Stable	No	22	22	0.265	-0.122	0.446	55.4	-28	-0.00467	0.446	8	8	2020-11-13 to 2024-05-07	0.318	-0.0364	1	0	-1	-0.005	1
CCR-AP-7	Fluoride	Increasing	Stable	No	23	23	0.389	0.353	0.0212	97.9	88	0.00667	0.0212	8	8	2020-11-12 to 2024-05-10	0.325	-0.214	0.536	46.4	-6	-0.021	0.536
CCR-AP-8	Fluoride	No Trend	No Trend	No	22	21	0.645	0.144	0.366	63.4	33	0.00438	0.366	8	8	2020-11-12 to 2024-05-10	0.79	0.255	0.454	54.6	7	0 01	0.454
CCR-AP-9	Fluoride	No Trend	Stable	No	21	21	0.195	0.0683	0.693	30.7	14	0.00118	0.693	8	8	2020-05-19 to 2024-05-08	0.138	-0.255	0.454	54.6	-7	-0.0065	0.454
Pooled Background	Fluoride	No Trend	Stable	No	67	67	0.335	0.00915	0.918	8.2	20	0	0.918	8	8	2023-05-23 to 2024-05-10	0.182	-0.5	0.108	89.2	-14	-0.019	0.108
CCR-AP-1R	Lead, Total	Increasing	Stable	No	23	23	0.83	0.364	0.0162	98.4	92	0.00173	0.0162	8	8	2021-05-13 to 2024-05-08	0.529	-0.5	0.108	89.2	-14	-0.00715	0.108
CCR-AP-2	Lead, Total	Increasing	Increasing	No	23	23	0.85	0.588	0.000102	100	148	0.0025	0.000102	8	8	2021-05-12 to 2024-05-08	0.697	0.786	0.00937	99.1	22	0.0101	0 00937
CCR-AP-3	Lead, Total	Increasing	No Trend	No	22	18	1.81	0.364	0.0203	98	83	0.0000267	0.0203	8	7	2020-11-13 to 2024-05-07	1.66	0.357	0.266	73.4	10	0.000151	0.266
CCR-AP-4R	Lead, Total	No Trend	Stable	Yes	22	21	0.916	0.135	0.397	60.3	31	0.000142	0.397	8	7	2020-11-13 to 2024-05-08	0.879	-0.286	0.386	61.4	-8	-0.000692	0.386
CCR-AP-5	Lead, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	22	9	2.19	NA	NA	NA	NA	NA	NA	8	7	2020-11-13 to 2024-05-13	1.69	0.429	0.174	82.6	12	0.0003	0.174
CCR-AP-6	Lead, Total	No Trend	No Trend	No	22	22	1	-0.121	0.446	55.4	-28	-0.000167	0.446	8	8	2020-11-13 to 2024-05-07	1.71	-0.0714	0.902	9.8	-2	-0.000437	0.902
CCR-AP-7	Lead, Total	Probably Decreasing	Not Evaluated - Majority of data (>50%) non-detect.	No	24	14	1.67	-0.289	0.0621	93.8	-74	-0.0000332	0.0621	8	2	2020-11-12 to 2024-05-10	0.648	NA	NA	NA	NA	NA	NA
CCR-AP-8	Lead, Total	No Trend	No Trend	No	22	21	0.824	0.193	0.224	77.6	44	0.0000383	0.224	8	7	2020-11-12 to 2024-05-10	0.821	0.0714	0.902	9.8	2	0.0000375	0.902
CCR-AP-9	Lead, Total	Probably Increasing	Stable	No	21	21	0.713	0.273	0.0904	91	57	0.000426	0.0904	8	8	2020-05-19 to 2024-05-08	0.529	-0.286	0.386	61.4	-8	-0.00173	0.386
Pooled Background	Lead, Total	No Trend	Stable	No	68	58	1.33	0.0976	0.246	75.4	220	0.0000713	0.246	8	6	2023-05-23 to 2024-05-10	0.961	-0.429	0.174	82.6	-12	-0.0026	0.174
CCR-AP-1R	Lithium, Total	Probably Increasing	Stable	No	23	23	0.588	0.284	0.0639	93.6	71	0.00307	0.0639	8	8	2021-05-13 to 2024-05-08	0.355	-0.327	0.319	68.1	-9	-0.00804	0.319
CCR-AP-2	Lithium, Total	Increasing	Increasing	No	23	18	0.738	0.353	0.0211	97.9	88	0.002	0.0211	8	8	2021-05-12 to 2024-05-08	0.704	0.929	0.00198	99.8	26	0.014	0 00198
CCR-AP-3	Lithium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	22	4	0.949	NA	NA	NA	NA	NA	NA	8	4	2020-11-13 to 2024-05-07	0.258	0.0806	0.894	10.6	2	0	0.894
CCR-AP-4R	Lithium, Total	Stable	Stable	No	22	16	0.772	-0.193	0.231	76.9	-43	-0.000262	0.231	8	7	2020-11-13 to 2024-05-08	0.854	0	1	0	0	-0.0002	1
CCR-AP-5	Lithium, Total	Decreasing	No Trend	No	22	22	0.458	-0.692	0.00000912	100	-158	-0.00514	0.00000912	8	8	2020-11-13 to 2024-05-13	0.462	0.143	0.711	28.9	4	0.002	0.711
CCR-AP-6	Lithium, Total	Decreasing	No Trend	No	22	11	1.37	-0.639	0.000065	100	-140	-0.00127	0.000065	8	5	2020-11-13 to 2024-05-07	1.05	0.0364	1	0	1	0.0000357	1
CCR-AP-7	Lithium, Total	Decreasing	No Trend	No	24	24	0.502	-0.394	0.00968	99	-104	-0.0002	0.00968	8	8	2020-11-12 to 2024-05-10	0.164	0.327	0.319	68.1	9	0.000204	0.319
CCR-AP-8	Lithium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	22	6	0.873	NA	NA	NA	NA	NA	NA	8	2	2020-11-12 to 2024-05-10	0.44	NA	NA	NA	NA	NA	NA
CCR-AP-9	Lithium, Total	Probably Increasing	Stable	No	21	21	0.423	0.279	0.0845	91.5	58	0.000554	0.0845	8	8	2020-05-19 to 2024-05-08	0.23	-0.0714	0.902	9.8	-2	-0.000625	0.902
Pooled Background	Lithium, Total	No Trend	Stable	No	68	68	0.924	0.062	0.461	53.9	140	0.0000833	0.461	8	8	2023-05-23 to 2024-05-10	0.734	-0.4	0.212	78.8	-11	-0.00864	0.212
CCR-AP-1R	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	22	0	1.25	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2021-05-13 to 2024-05-08	1.24	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-2	Mercury, Total	Not Evaluated - Majority of data (>50%) non-detect.	Probably Increasing	No	22	9	0.846	NA	NA	NA	NA	NA	NA	8	6	2021-05-12 to 2024-05-08	0.792	0.546	0.0809	91.9	15	0.0000405	0.0809
CCR-AP-3	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	21	0	0.306	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2020-11-13 to 2024-05-07	0.447	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-4R	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	21	0	0.343	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2020-11-13 to 2024-05-08	0.447	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-5	Mercury, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	21	3	1.65	NA	NA	NA	NA	NA	NA	8	3	2020-11-13 to 2024-05-13	1.33	NA	NA	NA	NA	NA	NA
CCR-AP-6	Mercury, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	21	2	0.593	NA	NA	NA	NA	NA	NA	8	2	2020-11-13 to 2024-05-07	0.676	NA	NA	NA	NA	NA	NA
CCR-AP-7	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	21	0	0.306	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2020-11-12 to 2024-05-10	0.447	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Mercury, Total	Not Evaluated - Only one detected result.	Not Evaluated - Only one detected result.	No	21	1	0.406	NA	NA	NA	NA	NA	NA	8	1	2020-11-12 to 2024-05-10	0.517	NA	NA	NA	NA	NA	NA

Note:
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		Mann Kendall Trends			Secular Trend Evaluation for All Data									Secular Trend Evaluation for Recent Data (subset of 8 most recent data points)								
					Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)		Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)	
Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
CCR-AP-9	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	20	0	0	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2020-05-19 to 2024-05-08	0	NA	No detected results.	NA	NA	NA	No detected results.
Pooled Background	Mercury, Total	Not Evaluated - No detected results.	Not Evaluated - No detected results.	No	63	0	0.963	NA	No detected results.	NA	NA	NA	No detected results.	8	0	2023-05-23 to 2024-05-10	0.505	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-1R	Molybdenum, Total	Stable	Decreasing	No	23	23	0.434	-0.121	0.442	55.8	-30	-0.0000778	0.442	8	8	2021-05-13 to 2024-05-08	0.61	-0.643	0.0354	96.5	-18	-0.000758	0.0354
CCR-AP-2	Molybdenum, Total	Increasing	No Trend	No	23	23	0.567	0.636	0.0000261	100	160	0.000331	0.0000261	8	8	2021-05-12 to 2024-05-08	0.309	0.5	0.108	89.2	14	0.0005	0.108
CCR-AP-3	Molybdenum, Total	Decreasing	No Trend	No	22	22	0.345	-0.446	0.00494	99.5	-100	-0.000262	0.00494	8	8	2020-11-13 to 2024-05-07	0.57	0.214	0.536	46.4	6	0.000371	0.536
CCR-AP-4R	Molybdenum, Total	Increasing	No Trend	No	22	19	1.12	0.41	0.00918	99.1	93	0.000153	0.00918	8	6	2020-11-13 to 2024-05-08	0.89	0.327	0.319	68.1	9	0.0011	0.319
CCR-AP-5	Molybdenum, Total	Decreasing	Stable	No	22	22	0.418	-0.506	0.00136	99.9	-114	-0.012	0.00136	8	8	2020-11-13 to 2024-05-13	0.492	-0.148	0.706	29.4	-4	-0.0138	0.706
CCR-AP-6	Molybdenum, Total	No Trend	No Trend	No	22	22	0.262	0.0398	0.821	17.9	9	0	0.821	8	8	2020-11-13 to 2024-05-07	0.383	0.143	0.711	28.9	4	0.00117	0.711
CCR-AP-7	Molybdenum, Total	Decreasing	No Trend	No	24	23	0.848	-0.674	0.0000054	100	-184	-0.000227	0.0000054	8	7	2020-11-12 to 2024-05-10	0.274	0.109	0.803	19.7	3	0.0000518	0.803
CCR-AP-8	Molybdenum, Total	Stable	Stable	No	22	22	0.372	-0.0726	0.668	33.2	-16	0	0.668	8	8	2020-11-12 to 2024-05-10	0.511	-0.255	0.454	54.6	-7	-0.000971	0.454
CCR-AP-9	Molybdenum, Total	Decreasing	No Trend	No	21	19	0.837	-0.52	0.0011	99.9	-109	-0.0003	0.0011	8	6	2020-05-19 to 2024-05-08	1.42	-0.357	0.266	73.4	-10	-0.00025	0.266
Pooled Background	Molybdenum, Total	Decreasing	Decreasing	No	68	65	0.747	-0.286	0.0006	99.9	-649	-0.0000761	0.0006	8	6	2023-05-23 to 2024-05-10	0.647	-0.618	0.0461	95.4	-17	-0.001	0.0461
CCR-AP-1R	Radium-226 & 228	No Trend	No Trend	No	21	21	0.675	0.248	0.124	87.6	52	0.124	0.124	8	8	2020-11-13 to 2024-05-08	0.675	0.357	0.266	73.4	10	1.24	0.266
CCR-AP-2	Radium-226 & 228	No Trend	No Trend	No	21	21	0.675	0.0667	0.695	30.5	14	0.0183	0.695	8	8	2020-11-12 to 2024-05-08	0.685	0.143	0.711	28.9	4	0.222	0.711
CCR-AP-3	Radium-226 & 228	No Trend	No Trend	No	20	20	0.652	0.0211	0.922	7.8	4	0.00597	0.922	8	8	2020-11-13 to 2024-05-07	0.733	0.0714	0.902	9.8	2	0.0326	0.902
CCR-AP-4R	Radium-226 & 228	No Trend	No Trend	No	20	20	1.67	-0.0105	0.974	2.6	-2	-0.0041	0.974	8	8	2020-11-13 to 2024-05-08	1.67	0.143	0.711	28.9	4	0.117	0.711
CCR-AP-5	Radium-226 & 228	No Trend	No Trend	No	20	20	1.09	0.168	0.315	68.5	32	0.0379	0.315	8	8	2020-11-13 to 2024-05-13	0.846	0.5	0.108	89.2	14	0.506	0.108
CCR-AP-6	Radium-226 & 228	Stable	Stable	No	20	19	0.929	0	1	0	0	-0.000548	1	8	7	2020-11-13 to 2024-05-07	0.621	0	1	0	0	-0.00971	1
CCR-AP-7	Radium-226 & 228	Stable	Increasing	No	21	21	0.533	-0.114	0.487	51.3	-24	-0.0149	0.487	8	8	2020-11-12 to 2024-05-10	0.58	0.643	0.0354	96.5	18	0.117	0.0354
CCR-AP-8	Radium-226 & 228	Stable	Stable	No	19	19	0.448	-0.135	0.441	55.9	-23	-0.0164	0.441	8	8	2020-11-12 to 2024-05-10	0.478	-0.0714	0.902	9.8	-2	-0.0715	0.902
CCR-AP-9	Radium-226 & 228	Increasing	No Trend	No	19	19	0.786	0.345	0.0424	95.8	59	0.182	0.0424	8	8	2020-05-19 to 2024-05-08	0.712	0.357	0.266	73.4	10	0.644	0.266
Pooled Background	Radium-226 & 228	No Trend	No Trend	No	61	61	0.971	0.108	0.22	78	198	0.0163	0.22	8	8	2023-05-22 to 2024-05-10	0.981	0.182	0.618	38.2	5	0.142	0.618
CCR-AP-1R	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	23	10	1.27	NA	NA	NA	NA	NA	NA	8	5	2021-05-13 to 2024-05-08	1.01	-0.327	0.319	68.1	-9	-0.0003	0.319
CCR-AP-2	Selenium, Total	Increasing	No Trend	No	23	16	1.14	0.364	0.018	98.2	90	0.00012	0.018	8	7	2021-05-12 to 2024-05-08	0.796	0.214	0.536	46.4	6	0.000105	0.536
CCR-AP-3	Selenium, Total	No Trend	No Trend	No	22	21	0.545	0.196	0.23	77	43	0.0000111	0.23	8	8	2020-11-13 to 2024-05-07	0.224	0.0772	0.898	10.2	2	0	0.898
CCR-AP-4R	Selenium, Total	Probably Increasing	Not Evaluated - Majority of data (>50%) non-detect.	No	22	11	1.8	0.321	0.0561	94.4	64	0.0000167	0.0561	8	3	2020-11-13 to 2024-05-08	0.212	NA	NA	NA	NA	NA	NA
CCR-AP-5	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	22	8	1.28	NA	NA	NA	NA	NA	NA	8	6	2020-11-13 to 2024-05-13	1.2	0.327	0.319	68.1	9	0.000312	0.319
CCR-AP-6	Selenium, Total	No Trend	Stable	No	22	17	0.965	0.143	0.378	62.2	32	0.00002	0.378	8	6	2020-11-13 to 2024-05-07	0.373	-0.0364	1	0	-1	-0.00001	1
CCR-AP-7	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	22	3	0.252	NA	NA	NA	NA	NA	NA	8	0	2020-11-12 to 2024-05-10	0	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Selenium, Total	No Trend	Stable	No	22	19	0.556	0.0849	0.609	39.1	19	0.00000714	0.609	8	8	2020-11-12 to 2024-05-10	0.538	-0.0364	1	0	-1	-0.0000125	1

Note:
Mann Kendall Trends are classified based on Aziz (2003) guidance.

		Mann Kendall Trends			Secular Trend Evaluation for All Data									Secular Trend Evaluation for Recent Data (subset of 8 most recent data points)								
					Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)		Mann-Kendall Test (R programming, package = Kendall, version = 2.2.1, function = MannKendall, non-detects substituted by 0.5*reporting limit)							Thiel-Sen Test (R programming, package = trend, version = 1.1.6, function = sens.slope, non-detects substituted by 0.5*reporting limit)	
Location	Constituent	Trends, All Data	Trends, Recent Data	Seasonal Mann Kendall Used	n	n, detected results	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value	n	n, detected results	recent data date range	Coefficient of Variance	Kendall's Tau	p-value	Confidence Factor	Kendall Score (S)	Sen Slope (mg/L per year)	p-value
CCR-AP-9	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	21	6	1.17	NA	NA	NA	NA	NA	NA	8	2	2020-05-19 to 2024-05-08	1.52	NA	NA	NA	NA	NA	NA
Pooled Background	Selenium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	66	19	1.31	NA	NA	NA	NA	NA	NA	8	3	2023-05-23 to 2024-05-10	0.398	NA	NA	NA	NA	NA	NA
CCR-AP-1R	Thallium, Total	Increasing	Stable	No	23	16	0.919	0.325	0.0357	96.4	80	0.000026	0.0357	8	5	2021-05-13 to 2024-05-08	0.85	-0.109	0.803	19.7	-3	-0.000011	0.803
CCR-AP-2	Thallium, Total	Increasing	No Trend	No	23	20	1.52	0.615	0.0000515	100	154	0.00005	0.0000515	8	8	2021-05-12 to 2024-05-08	1.35	0.109	0.803	19.7	3	0.0000675	0.803
CCR-AP-3	Thallium, Total	Not Evaluated - Only one detected result.	Not Evaluated - No detected results.	No	22	1	0.277	NA	NA	NA	NA	NA	NA	8	0	2020-11-13 to 2024-05-07	0.314	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-4R	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Majority of data (>50%) non-detect.	No	22	10	1.09	NA	NA	NA	NA	NA	NA	8	2	2020-11-13 to 2024-05-08	0.342	NA	NA	NA	NA	NA	NA
CCR-AP-5	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	No Trend	No	22	7	1.57	NA	NA	NA	NA	NA	NA	8	4	2020-11-13 to 2024-05-13	0.579	0.403	0.232	76.8	10	0.0000567	0.232
CCR-AP-6	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	22	8	1.06	NA	NA	NA	NA	NA	NA	8	0	2020-11-13 to 2024-05-07	0.314	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-7	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	24	4	0.389	NA	NA	NA	NA	NA	NA	8	0	2020-11-12 to 2024-05-10	0.314	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-8	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	22	5	0.469	NA	NA	NA	NA	NA	NA	8	0	2020-11-12 to 2024-05-10	0.314	NA	No detected results.	NA	NA	NA	No detected results.
CCR-AP-9	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - No detected results.	No	21	9	1.53	NA	NA	NA	NA	NA	NA	8	0	2020-05-19 to 2024-05-08	1.5	NA	No detected results.	NA	NA	NA	No detected results.
Pooled Background	Thallium, Total	Not Evaluated - Majority of data (>50%) non-detect.	Not Evaluated - Only one detected result.	No	68	29	1.15	NA	NA	NA	NA	NA	NA	8	1	2023-05-23 to 2024-05-10	0.356	NA	NA	NA	NA	NA	NA

Note:
Mann Kendall test run on seasonally adjusted data if seasonal trend identified. Seasonal trends identified based on Kruskall Wallis test and time series plots, where n seasons = 4 and (Dec-Feb, Mar-May, Jun-Aug, Sept-Nov).

Note:
Mann Kendall Trends are classified based on Aziz (2003) guidance.

Table A-5. Upper Tolerance Limits (UTLs) & Updated Groundwater Protection Standards (GWPS)

		Interwell Background Data Characterization [a]												Groundwater Protection Standard (GWPS) Determination				UTL Calculation Details		
Constituent	Units	n	n, non-detects	max reporting limit	max detected value	mean	median	min sample date	max sample date	standard deviation	coefficient of variation	Mann Kendall trend	normalizing data transformation (if any)	UTL	UTL Result Detection Status [b]	MCL/RSL	GWPS	GWPS Source	UTL calculation method	UTL calculation details	Minimum Coverage (%)
Antimony, Total	mg/L	68	33	0.02	0.0079	0.00317	0.002	2016-06-10	2024-05-10	0.00465	1.47	No Trend	NA - Original Data	0.02	No	0.006	0.02	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Barium, Total	mg/L	68	0	NA	0.72	0.212	0.165	2016-06-10	2024-05-10	0.13	0.615	Probably Increasing	NA - Original Data	0.72	Yes	2	2	MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Beryllium, Total	mg/L	68	19	0.01	0.0066	0.0016	0.001	2016-06-10	2024-05-10	0.00188	1.17	Increasing	NA - Original Data	0.01	No	0.004	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Cadmium, Total	mg/L	68	45	0.01	0.00087	0.00156	0.001	2016-06-10	2024-05-10	0.00243	1.56	No Trend	NA - Original Data	0.01	No	0.005	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Chromium, Total	mg/L	68	12	0.01	0.16	0.0281	0.012	2016-06-10	2024-05-10	0.0385	1.37	Increasing	NA - Original Data	0.16	Yes	0.1	0.16	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Cobalt, Total	mg/L	68	2	0.002	0.081	0.0158	0.0098	2016-06-10	2024-05-10	0.0197	1.24	No Trend	NA - Original Data	0.081	Yes	0.006	0.081	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Fluoride	mg/L	67	0	NA	0.81	0.387	0.36	2016-06-10	2024-05-10	0.13	0.335	No Trend	NA - Original Data	0.646	NA	4	4	MCL/RSL	Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.1)	Background mean + K * Background Standard Deviation	NA
Lead, Total	mg/L	68	10	0.003	0.094	0.0163	0.0085	2016-06-10	2024-05-10	0.0215	1.32	No Trend	NA - Original Data	0.094	Yes	0.015	0.094	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Lithium, Total	mg/L	68	0	NA	0.23	0.0502	0.0385	2016-06-10	2024-05-10	0.0464	0.924	No Trend	NA - Original Data	0.23	Yes	0.04	0.23	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Mercury, Total	mg/L	63	63	0.002	NA	0.000243	0.0002	2016-06-10	2024-05-10	0.000234	0.963	All non-detect results.	NA - Original Data	0.002	No	0.002	0.002	BTV = MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.4
Molybdenum, Total	mg/L	68	3	0.05	0.023	0.00675	0.0056	2016-06-10	2024-05-10	0.0067	0.993	Decreasing	NA - Original Data	0.05	No	0.1	0.1	MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7
Radium-226 & 228	pCi/L	61	0	NA	14.4	3.12	1.93	2016-06-10	2024-05-10	3.03	0.971	No Trend	NA - Original Data	14.4	Yes	5	14.4	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.2
Selenium, Total	mg/L	66	47	0.05	0.025	0.00815	0.005	2016-06-10	2024-05-10	0.0111	1.37	No Trend	NA - Original Data	0.05	No	0.05	0.05	BTV = MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.6
Thallium, Total	mg/L	68	39	0.01	0.0027	0.00107	0.001	2016-06-10	2024-05-10	0.0014	1.31	Increasing	NA - Original Data	0.01	No	0.002	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)	Maximum Value (ND = RL, Non-discriminatory of detection status)	95.7

Note:

[a] Interwell background datasets are analyte specific and include data collected from background wells (CCR-AP-1R, CCR-AP-7, and CCR-AP-9). Interwell background datasets were re-tested for outliers, secular trends, and data normality. No outliers were removed.

[b] In some cases, the maximum value selected as the UTL is a non-detect result with an elevated reporting limit.

Units = mg/L, milligrams per liter. pCi/L = picocuries per liter.

Table A-5. Intrawell Arsenic Prediction Limit Calculations

			Baseline Data Characterization [a]												Prediction Limits		Parametric UPL Calculation Statistics			Non-Parametric UPL Calculation Statistics	
Location	Constituent	Units	Baseline Distribution [a]	Prediction Interval Calculation	min baseline sample date	compliance sample sample	n	n, non-detects	max	mean	standard deviation	Trend (Baseline Data)	degrees of freedom	future samples (M)	Prediction Limit Calculation Method	UPL	confidence level (%)	t (percentile of student's t-test)	t quantile	actual confidence level (%)	false positive rate (%)
CCR-AP-2	Arsenic, Total	mg/L	Normal (Baseline, 95% Confidence)	Parametric	2016-06-10	2023-07-28	21	0	0.048	0.0143	0.0119	Increasing	20	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.0526	99	0.9975	3.153	NA	NA
CCR-AP-3	Arsenic, Total	mg/L	Normal (Baseline, 95% Confidence)	Parametric	2016-06-10	2023-05-23	20	0	0.095	0.0759	0.00848	Increasing	19	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.103	99	0.9975	3.174	NA	NA
CCR-AP-4R	Arsenic, Total	mg/L	Normal (Baseline, ln Trans, 95% Confidence)	Parametric (ln Transformed Data)	2016-06-10	2023-05-23	20	0	0.33	0.112	0.081	Increasing	19	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.707	99	0.9975	3.174	NA	NA
CCR-AP-5	Arsenic, Total	mg/L	Not normal (Baseline, ln Trans, 95% Confidence)	Non-Parametric	2016-06-10	2023-05-25	19	2	0.024	0.00355	0.00584	Increasing	18	4	Non-Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.3.1)	0.024	NA	NA	NA	82.6	17.4
CCR-AP-6	Arsenic, Total	mg/L	Normal (Baseline, 95% Confidence)	Parametric	2016-06-10	2023-05-23	20	0	0.12	0.0942	0.0221	Increasing	19	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.166	99	0.9975	3.174	NA	NA
CCR-AP-8	Arsenic, Total	mg/L	Normal (Baseline, 95% Confidence)	Parametric	2017-03-09	2023-05-25	20	0	0.12	0.091	0.0216	Increasing	19	4	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)	0.161	99	0.9975	3.174	NA	NA

Note:

[a] Baseline data refer to the entire statistical dataset, except the most recent data point (May 2023). The most recent data points is considered a 'compliance' or 'recent' sample. Baseline datasets were re-tested for outliers, secular trends, and data normality. No outliers were removed. Prediction limits calculated using simple replacement with the reporting limit for non-detect results.

Table A-6. Confidence Intervals

			Confidence Interval (CI) Dataset						CI Calculation [a]			SSL Confirmation		Non-Parametric CI Statistics (if applicable)	
Location	Constituent	Units	n	max (Rank n)	min (Rank 1)	median	mean	standard deviation	CI calculation method	degrees of freedom	95% Confidence LCL	GWPS	LCL > GWPS?	bootstrap iterations	bootstrap median
CCR-AP-5	Molybdenum, Total	mg/L	22	0.53	0.046	0.315	0.287	0.12	Calculation of the Confidence Interval Around the Normal Mean (Parametric)	21	0.234	0.1	Yes	NA	NA

Note:

Confidence intervals are calculated for analyte/well pairs with GWPS exceedances in the sampling event dataset.

[a] The 95% lower confience level (LCL) is compared to the Groundwater Protection Standard (GWPS) to confirm a statistically significant level (SSL). The 99% confidence interval is also shown for purposes of comparison. UCL = upper confidence level.

Table A-7. Groundwater Protection Standard (GWPS) Summary

Background Location	Constituent	Units	Background Threshold Value (BTV)	BTV Type	MCL/RSL	GWPS	GWPS Source	BTV Calculation Method
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Antimony, Total	mg/L	0.02	Interwell UTL	0.006	0.02	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-2	Arsenic, Total	mg/L	0.0526	Intrawell UPL	0.01	0.0526	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-3	Arsenic, Total	mg/L	0.103	Intrawell UPL	0.01	0.103	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-4R	Arsenic, Total	mg/L	0.707	Intrawell UPL	0.01	0.707	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-5	Arsenic, Total	mg/L	0.024	Intrawell UPL	0.01	0.024	BTV	Non-Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.3.1)
CCR-AP-6	Arsenic, Total	mg/L	0.166	Intrawell UPL	0.01	0.166	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-8	Arsenic, Total	mg/L	0.161	Intrawell UPL	0.01	0.161	BTV	Parametric Prediction Limit for M Future Values (USEPA, 2009 - Chapter 18.2.1)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Barium, Total	mg/L	0.72	Interwell UTL	2	2	MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Beryllium, Total	mg/L	0.01	Interwell UTL	0.004	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Cadmium, Total	mg/L	0.01	Interwell UTL	0.005	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Chromium, Total	mg/L	0.16	Interwell UTL	0.1	0.16	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Cobalt, Total	mg/L	0.081	Interwell UTL	0.006	0.081	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Fluoride	mg/L	0.646	Interwell UTL	4	4	MCL/RSL	Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.1)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Lead, Total	mg/L	0.094	Interwell UTL	0.015	0.094	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Lithium, Total	mg/L	0.23	Interwell UTL	0.04	0.23	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Mercury, Total	mg/L	0.002	Interwell UTL	0.002	0.002	BTV = MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Molybdenum, Total	mg/L	0.05	Interwell UTL	0.1	0.1	MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Radium-226 & 228	pCi/L	14.4	Interwell UTL	5	14.4	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Selenium, Total	mg/L	0.05	Interwell UTL	0.05	0.05	BTV = MCL/RSL	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)
CCR-AP-1R, CCR-AP-7, CCR-AP-9	Thallium, Total	mg/L	0.01	Interwell UTL	0.002	0.01	BTV	Non-Parametric Tolerance Limits (USEPA, 2009 - Chapter 17.2.2)

Background Threshold Values (BTVs) include Upper Threshold Limits (UTLs) calculated from pooled/interwell background data and Upper Prediction Limits (UPLs) for Arsenic calculated from intrawell data. Groundwater Protection Standard (GWPS) is the maximum value between the BTV and the Maximum Contaminant Level/Regional Screening Level (MCL/RSL).

Table A-8. Groundwater Protection Standard (GWPS) Comparison Table

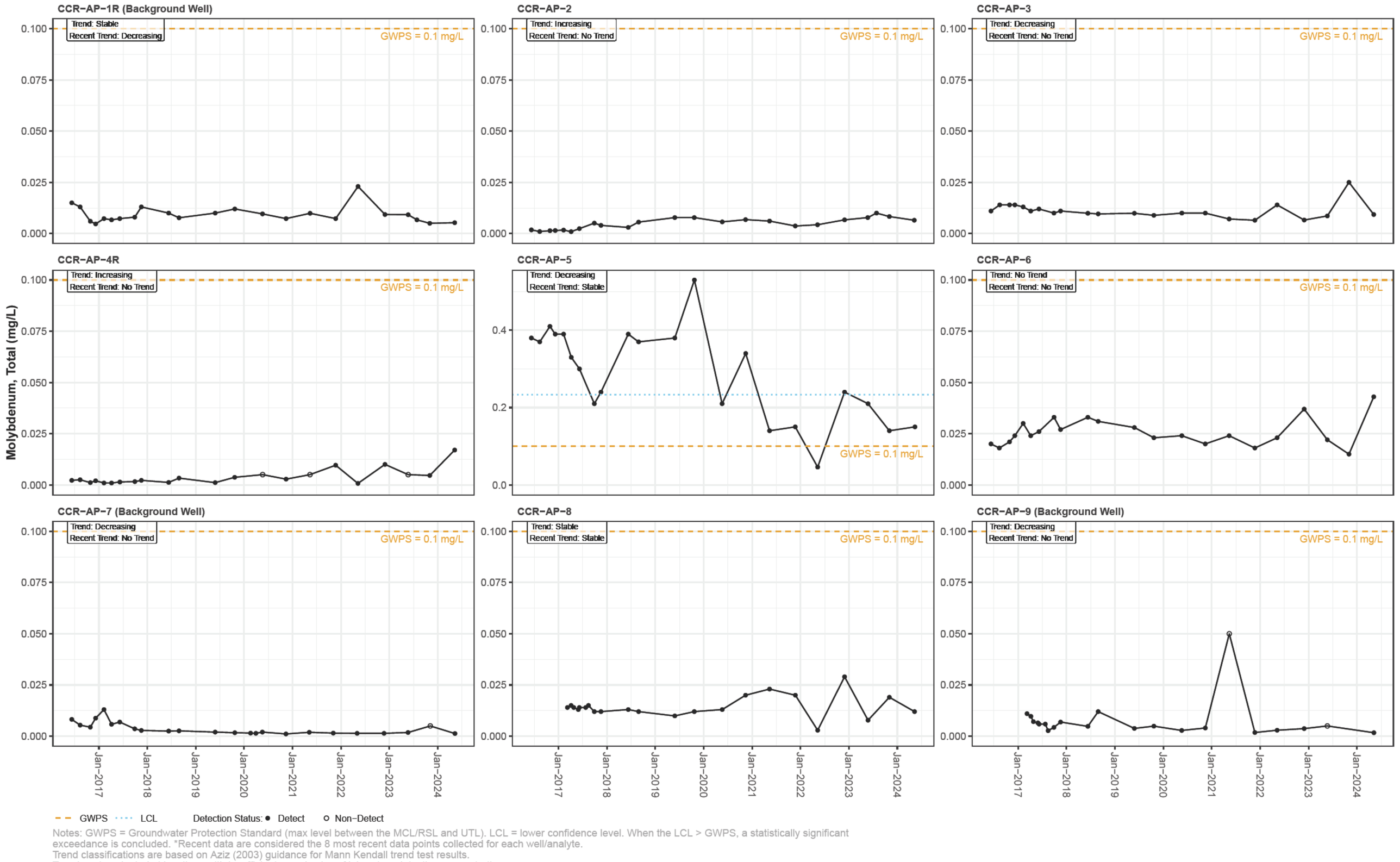
Location	Constituent	Units	Sample Date	Sample Result	Background Threshold Value (BTV)	BTV Type	GWPS	GWPS Exceedance	LCL	SSL Confirmed
CCR-AP-5	Molybdenum, Total	mg/L	2024-05-13	0.15	0.05	Interwell UTL	0.1	Yes	0.234	Yes
CCR-AP-2	Antimony, Total	mg/L	2024-05-08	0.0011 J	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-3	Antimony, Total	mg/L	2024-05-07	0.002 U	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-4R	Antimony, Total	mg/L	2024-05-08	0.002 U	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-5	Antimony, Total	mg/L	2024-05-13	0.002 U	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-6	Antimony, Total	mg/L	2024-05-07	0.00082 J	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-8	Antimony, Total	mg/L	2024-05-10	0.00064 J	0.02	Interwell UTL	0.02	No	NA	No
CCR-AP-2	Arsenic, Total	mg/L	2024-05-08	0.025	0.0526	Intrawell UPL	0.0526	No	NA	No
CCR-AP-3	Arsenic, Total	mg/L	2024-05-07	0.051	0.103	Intrawell UPL	0.103	No	NA	No
CCR-AP-4R	Arsenic, Total	mg/L	2024-05-08	0.027	0.707	Intrawell UPL	0.707	No	NA	No
CCR-AP-5	Arsenic, Total	mg/L	2024-05-13	0.00085 J	0.024	Intrawell UPL	0.024	No	NA	No
CCR-AP-6	Arsenic, Total	mg/L	2024-05-07	0.057	0.166	Intrawell UPL	0.166	No	NA	No
CCR-AP-8	Arsenic, Total	mg/L	2024-05-10	0.013	0.161	Intrawell UPL	0.161	No	NA	No
CCR-AP-2	Barium, Total	mg/L	2024-05-08	0.83	0.72	Interwell UTL	2	No	NA	No
CCR-AP-3	Barium, Total	mg/L	2024-05-07	0.38	0.72	Interwell UTL	2	No	NA	No
CCR-AP-4R	Barium, Total	mg/L	2024-05-08	0.53	0.72	Interwell UTL	2	No	NA	No
CCR-AP-5	Barium, Total	mg/L	2024-05-13	0.046	0.72	Interwell UTL	2	No	NA	No
CCR-AP-6	Barium, Total	mg/L	2024-05-07	0.43	0.72	Interwell UTL	2	No	NA	No
CCR-AP-8	Barium, Total	mg/L	2024-05-10	0.27	0.72	Interwell UTL	2	No	NA	No
CCR-AP-2	Beryllium, Total	mg/L	2024-05-08	0.0037	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-3	Beryllium, Total	mg/L	2024-05-07	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-4R	Beryllium, Total	mg/L	2024-05-08	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-5	Beryllium, Total	mg/L	2024-05-13	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-6	Beryllium, Total	mg/L	2024-05-07	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-8	Beryllium, Total	mg/L	2024-05-10	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-2	Cadmium, Total	mg/L	2024-05-08	0.003	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-3	Cadmium, Total	mg/L	2024-05-07	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-4R	Cadmium, Total	mg/L	2024-05-08	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-5	Cadmium, Total	mg/L	2024-05-13	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-6	Cadmium, Total	mg/L	2024-05-07	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-8	Cadmium, Total	mg/L	2024-05-10	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-2	Chromium, Total	mg/L	2024-05-08	0.11	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-3	Chromium, Total	mg/L	2024-05-07	0.0031 J	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-4R	Chromium, Total	mg/L	2024-05-08	0.005 U	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-5	Chromium, Total	mg/L	2024-05-13	0.002 J	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-6	Chromium, Total	mg/L	2024-05-07	0.0027 J	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-8	Chromium, Total	mg/L	2024-05-10	0.0039 J	0.16	Interwell UTL	0.16	No	NA	No
CCR-AP-2	Cobalt, Total	mg/L	2024-05-08	0.048	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-3	Cobalt, Total	mg/L	2024-05-07	0.0061	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-4R	Cobalt, Total	mg/L	2024-05-08	0.0028	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-5	Cobalt, Total	mg/L	2024-05-13	0.0025	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-6	Cobalt, Total	mg/L	2024-05-07	0.0034	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-8	Cobalt, Total	mg/L	2024-05-10	0.0044	0.081	Interwell UTL	0.081	No	NA	No
CCR-AP-2	Fluoride	mg/L	2024-05-08	0.27	0.646	Interwell UTL	4	No	NA	No
CCR-AP-3	Fluoride	mg/L	2024-05-07	0.35	0.646	Interwell UTL	4	No	NA	No
CCR-AP-4R	Fluoride	mg/L	2024-05-08	0.61	0.646	Interwell UTL	4	No	NA	No
CCR-AP-5	Fluoride	mg/L	2024-05-13	0.84	0.646	Interwell UTL	4	No	NA	No
CCR-AP-6	Fluoride	mg/L	2024-05-07	0.37	0.646	Interwell UTL	4	No	NA	No
CCR-AP-8	Fluoride	mg/L	2024-05-10	0.22	0.646	Interwell UTL	4	No	NA	No
CCR-AP-2	Lead, Total	mg/L	2024-05-08	0.056	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-3	Lead, Total	mg/L	2024-05-07	0.00097 J	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-4R	Lead, Total	mg/L	2024-05-08	0.001 U	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-5	Lead, Total	mg/L	2024-05-13	0.00068 J	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-6	Lead, Total	mg/L	2024-05-07	0.0012	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-8	Lead, Total	mg/L	2024-05-10	0.003	0.094	Interwell UTL	0.094	No	NA	No
CCR-AP-2	Lithium, Total	mg/L	2024-05-08	0.085	0 23	Interwell UTL	0.23	No	NA	No
CCR-AP-3	Lithium, Total	mg/L	2024-05-07	0.0028 J	0 23	Interwell UTL	0.23	No	NA	No
CCR-AP-4R	Lithium, Total	mg/L	2024-05-08	0.0045 J	0 23	Interwell UTL	0.23	No	NA	No
CCR-AP-5	Lithium, Total	mg/L	2024-05-13	0.056	0 23	Interwell UTL	0.23	No	NA	No
CCR-AP-6	Lithium, Total	mg/L	2024-05-07	0.0057 J	0 23	Interwell UTL	0.23	No	NA	No
CCR-AP-8	Lithium, Total	mg/L	2024-05-10	0.0039 J	0 23	Interwell UTL	0.23	No	NA	No

Background Threshold Values (BTVs) include Upper Threshold Limits (UTLs) calculated from pooled/interwell background data and Upper Prediction Limits (UPLs) for Arsenic calculated from intrawell data. Groundwater Protection Standard (GWPS) is the maximum value between the BTV and the Maximum Contaminant Level/Regional Screening Level (MCL/RSL). Lower Confidence Limit (LCL) calculated if the event sample result exceeds the GWPS. If the LCL is greater than the GWPS, a Statistically Significant Level (SSL) is confirmed.

Location	Constituent	Units	Sample Date	Sample Result	Background Threshold Value (BTV)	BTV Type	GWPS	GWPS Exceedance	LCL	SSL Confirmed
CCR-AP-2	Mercury, Total	mg/L	2024-05-08	0.00016 J	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-3	Mercury, Total	mg/L	2024-05-07	0.0002 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-4R	Mercury, Total	mg/L	2024-05-08	0.0002 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-5	Mercury, Total	mg/L	2024-05-13	0.0002 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-6	Mercury, Total	mg/L	2024-05-07	0.0002 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-8	Mercury, Total	mg/L	2024-05-10	0.0002 U	0.002	Interwell UTL	0.002	No	NA	No
CCR-AP-2	Molybdenum, Total	mg/L	2024-05-08	0.0065	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-3	Molybdenum, Total	mg/L	2024-05-07	0.0093	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-4R	Molybdenum, Total	mg/L	2024-05-08	0.017	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-6	Molybdenum, Total	mg/L	2024-05-07	0.043	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-8	Molybdenum, Total	mg/L	2024-05-10	0.012	0.05	Interwell UTL	0.1	No	NA	No
CCR-AP-2	Radium-226 & 228	pCi/L	2024-05-08	3.22 J+	14.4	Interwell UTL	14.4	No	NA	No
CCR-AP-3	Radium-226 & 228	pCi/L	2024-05-07	0.896 J	14.4	Interwell UTL	14.4	No	NA	No
CCR-AP-4R	Radium-226 & 228	pCi/L	2024-05-08	1.21 J	14.4	Interwell UTL	14.4	No	NA	No
CCR-AP-5	Radium-226 & 228	pCi/L	2024-05-13	0.877 J	14.4	Interwell UTL	14.4	No	NA	No
CCR-AP-6	Radium-226 & 228	pCi/L	2024-05-07	0.71 UJ	14.4	Interwell UTL	14.4	No	NA	No
CCR-AP-8	Radium-226 & 228	pCi/L	2024-05-10	1.08 J	14.4	Interwell UTL	14.4	No	NA	No
CCR-AP-2	Selenium, Total	mg/L	2024-05-08	0.0027 J	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-3	Selenium, Total	mg/L	2024-05-07	0.0016 J	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-4R	Selenium, Total	mg/L	2024-05-08	0.005 U	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-5	Selenium, Total	mg/L	2024-05-13	0.00095 J	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-6	Selenium, Total	mg/L	2024-05-07	0.005 U	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-8	Selenium, Total	mg/L	2024-05-10	0.0021 J	0.05	Interwell UTL	0.05	No	NA	No
CCR-AP-2	Thallium, Total	mg/L	2024-05-08	0.001	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-3	Thallium, Total	mg/L	2024-05-07	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-4R	Thallium, Total	mg/L	2024-05-08	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-5	Thallium, Total	mg/L	2024-05-13	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-6	Thallium, Total	mg/L	2024-05-07	0.001 U	0.01	Interwell UTL	0.01	No	NA	No
CCR-AP-8	Thallium, Total	mg/L	2024-05-10	0.001 U	0.01	Interwell UTL	0.01	No	NA	No

Background Threshold Values (BTVs) include Upper Threshold Limits (UTLs) calculated from pooled/interwell background data and Upper Prediction Limits (UPLs) for Arsenic calculated from intrawell data. Groundwater Protection Standard (GWPS) is the maximum value between the BTV and the Maximum Contaminant Level/Regional Screening Level (MCL/RSL). Lower Confidence Limit (LCL) calculated if the event sample result exceeds the GWPS. If the LCL is greater than the GWPS, a Statistically Significant Level (SSL) is confirmed.

Assessment Monitoring Trend Analysis for Molybdenum, Total



Notes: GWPS = Groundwater Protection Standard (max level between the MCL/RSL and UTL). LCL = lower confidence level. When the LCL > GWPS, a statistically significant exceedance is concluded. *Recent data are considered the 8 most recent data points collected for each well/analyte.
Trend classifications are based on Aziz (2003) guidance for Mann Kendall trend test results.
Trends not evaluated at locations with insufficient sample size of laboratory detection concentrations.

APPENDIX B
Field Forms

HALEY & ALDRICH

GROUNDWATER SAMPLING RECORD

Page 1 of 1

PROJECT	Vectren Culley	H&A FILE NO.	
LOCATION	Newburgh IN	PROJECT MGR.	
CLIENT	Vectren	FIELD REP	Hayley Tarin
CONTRACTOR	ATLAS	DATE	12-22-23

GROUNDWATER SAMPLING INFORMATION

Well No.		CCR-AP-1R					
Water Depth (ft)		53.83					
Time							
Product							
Depth Of Well (ft)							
Inside Diameter (in)		2					
Standing Water Depth (ft) [1]							
Volume Of Water In Well (gal)							
Purging Device		sleeve					
Volume of Bailer/Pump Capacity							
Cleaning Procedure							
Bails Removed/ Volume Removed							
Time Purging Started							
Time Purging Stopped							
Sampling Device							
Cleaning Procedure							
TIME SAMPLES TAKEN	VOA						
	ABN						
	Metals						
		Sample	12:25				
PARAMETERS	Time	12:25					
	DTW	53.83					
	pH	6.76					
	Conductivity	1.59 mS/cm					
	Turbidity	208					
	Dissolved Oxygen	11.72					
	Temp, ^{0}C	12.89					
	ORP	-45					

Remarks: (ie: field filtrations, persons communicated with at site, etc.)

1. Standing Water Depth = Depth of Well - Water Depth

Form 3005

CENTERPOINT ENERGY - FB CULLEY STATION
EAST ASH POND
CCR Groundwater Sampling Event
Gauging Date: May 6, 2024
Atlas Project No. 170LF01647

WELL ID	DATE	TIME	DTW FROM TOC
East Ash Pond Wells			
CCR-AP-2	5/6/2024	10:35	30.73
CCR-AP-3R	5/6/2024	13:30	37.12
CCR-AP-4R	5/6/2024	10:40	17.49
CCR-AP-5	5/6/2024	10:25	13.95
CCR-AP-5I	5/6/2024	10:26	12.29
CCR-AP-6	5/6/2024	13:40	38.75
CCR-AP-6I	5/6/2024	13:40	39.25
CCR-AP-8	5/6/2024	14:00	37.11
CCR-AP-8I	5/6/2024	14:00	28.82
CCR-AP-11	5/6/2024	10:30	14.95
Background Wells			
CCR-AP-1R	5/6/2024	10:10	44.46
CCR-AP-7	5/6/2024	10:00	4.65
CCR-AP-9	5/6/2024	10:15	59.91

NOTES
DTW= Depth to Water
TOC= Top of Casing

Low-Flow Test Report:

Test Date / Time: 5/7/2024 1:24:14 PM
Project: Culley East
Operator Name: Hayley Torres

Location Name: CCR-AP-6I **Well Diameter: 2 in** **Casing Type: Pvc** **Screen Length: 10 ft** **Top of Screen: 64.7 ft** **Total Depth: 74.7 ft** **Initial Depth to Water: 39.02 ft**	**Pump Type: Mp-50** **Pump Intake From TOC: 69.7 m** **Estimated Total Volume Pumped: 10260 ml** **Flow Cell Volume: 130 ml** **Final Flow Rate: 380 ml/min** **Final Draw Down: 0 ft**	**Instrument Used: Aqua TROLL 600** **Serial Number: 651925**

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 5	
5/7/2024 1:24 PM	00:00	7.48 pH	18.54 °C	3,396.7 µS/cm	6.75 mg/L	1.86 NTU	241.1 mV	39.02 ft	380.00 ml/min
5/7/2024 1:27 PM	03:00	7.32 pH	18.19 °C	1,691.0 µS/cm	0.47 mg/L	6.64 NTU	-39.5 mV	39.02 ft	380.00 ml/min
5/7/2024 1:30 PM	06:00	7.30 pH	18.13 °C	1,587.9 µS/cm	0.27 mg/L	6.12 NTU	-54.7 mV	39.02 ft	380.00 ml/min
5/7/2024 1:33 PM	09:00	7.31 pH	18.16 °C	1,559.1 µS/cm	0.21 mg/L	8.17 NTU	-63.0 mV	39.02 ft	380.00 ml/min
5/7/2024 1:36 PM	12:00	7.33 pH	18.18 °C	1,563.2 µS/cm	0.18 mg/L	5.30 NTU	-69.0 mV	39.02 ft	380.00 ml/min
5/7/2024 1:39 PM	15:00	7.34 pH	18.17 °C	1,570.0 µS/cm	0.17 mg/L	4.14 NTU	-73.7 mV	39.02 ft	380.00 ml/min
5/7/2024 1:42 PM	18:00	7.35 pH	18.14 °C	1,581.9 µS/cm	0.16 mg/L	1.52 NTU	-76.8 mV	39.02 ft	380.00 ml/min
5/7/2024 1:45 PM	21:00	7.36 pH	18.15 °C	1,621.2 µS/cm	0.15 mg/L	1.55 NTU	-78.1 mV	39.02 ft	380.00 ml/min
5/7/2024 1:48 PM	24:00	7.36 pH	18.23 °C	1,631.3 µS/cm	0.15 mg/L	1.44 NTU	-78.2 mV	39.02 ft	380.00 ml/min
5/7/2024 1:51 PM	27:00	7.37 pH	18.20 °C	1,637.3 µS/cm	0.15 mg/L	1.18 NTU	-78.3 mV	39.02 ft	380.00 ml/min

Samples

Sample ID:	Description:

Low-Flow Test Report:

Test Date / Time: 5/10/2024 11:20:07 AM
Project: Culley East (2)
Operator Name: Hayley Torres

Location Name: CCR-AP-7 **Well Diameter: 2 in** **Casing Type: Pvc** **Screen Length: 10 ft** **Top of Screen: 20 ft** **Total Depth: 30 ft** **Initial Depth to Water: 4.30 ft**	**Pump Type: Mp-50** **Pump Intake From TOC: 25 ft** **Estimated Total Volume Pumped: 1221.25 ml** **Flow Cell Volume: 130 ml** **Final Flow Rate: 25 ml/min** **Final Draw Down: 1.05 ft**	**Instrument Used: Aqua TROLL 600** **Serial Number: 651925**

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 5	
5/10/2024 11:20 AM	00:00	7.00 pH	19.18 °C	1,056.6 µS/cm	4.74 mg/L	66.84 NTU	157.9 mV	4.30 ft	25.00 ml/min
5/10/2024 11:23 AM	03:00	6.99 pH	18.83 °C	1,063.3 µS/cm	3.87 mg/L	44.60 NTU	153.3 mV		25.00 ml/min
5/10/2024 11:26 AM	06:00	6.98 pH	18.81 °C	1,076.7 µS/cm	3.46 mg/L	43.47 NTU	149.2 mV		25.00 ml/min
5/10/2024 11:26 AM	06:51	6.97 pH	18.88 °C	1,078.4 µS/cm	3.36 mg/L	35.10 NTU	148.3 mV		25.00 ml/min
5/10/2024 11:29 AM	09:51	6.97 pH	18.48 °C	1,077.8 µS/cm	3.15 mg/L	52.53 NTU	144.6 mV	4.53 ft	25.00 ml/min
5/10/2024 11:32 AM	12:51	6.97 pH	18.25 °C	1,073.9 µS/cm	3.01 mg/L	65.32 NTU	141.0 mV		25.00 ml/min
5/10/2024 11:35 AM	15:51	6.96 pH	18.69 °C	1,087.4 µS/cm	2.91 mg/L	84.98 NTU	136.2 mV		25.00 ml/min
5/10/2024 11:38 AM	18:51	6.96 pH	19.14 °C	1,092.0 µS/cm	2.81 mg/L	110.98 NTU	132.2 mV		25.00 ml/min
5/10/2024 11:41 AM	21:51	6.96 pH	18.86 °C	1,072.3 µS/cm	3.01 mg/L	27.95 NTU	127.0 mV		25.00 ml/min
5/10/2024 11:44 AM	24:51	6.96 pH	18.75 °C	1,070.2 µS/cm	2.81 mg/L	22.61 NTU	122.0 mV		25.00 ml/min
5/10/2024 11:47 AM	27:51	6.95 pH	19.24 °C	1,067.7 µS/cm	2.69 mg/L	30.75 NTU	118.3 mV	4.81 ft	25.00 ml/min
5/10/2024 11:50 AM	30:51	6.94 pH	18.61 °C	1,084.2 µS/cm	2.71 mg/L	52.52 NTU	113.7 mV		25.00 ml/min
5/10/2024 11:53 AM	33:51	6.95 pH	17.87 °C	1,075.5 µS/cm	3.34 mg/L	19.81 NTU	111.5 mV		25.00 ml/min
5/10/2024 11:56 AM	36:51	6.95 pH	18.03 °C	1,079.4 µS/cm	2.89 mg/L	23.27 NTU	99.1 mV		25.00 ml/min
5/10/2024 11:59 AM	39:51	6.95 pH	17.69 °C	1,071.0 µS/cm	2.81 mg/L	22.64 NTU	78.2 mV		25.00 ml/min
5/10/2024 12:02 PM	42:51	6.96 pH	18.24 °C	1,081.4 µS/cm	2.79 mg/L	26.44 NTU	62.7 mV		25.00 ml/min

5/10/2024 12:05 PM	45:51	6.96 pH	18.17 °C	1,071.6 µS/cm	2.72 mg/L	28.84 NTU	60.0 mV		25.00 ml/min
5/10/2024 12:08 PM	48:51	6.96 pH	18.49 °C	1,075.0 µS/cm	2.72 mg/L	39.15 NTU	58.3 mV	5.35 ft	25.00 ml/min

Samples

Sample ID:	Description:

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 5/8/2024 11:39:13 AM
Project: Culley - East AP-8I 5-8-24
Operator Name: Mykah Bertram

Location Name: CCR-AP-8I **Latitude: 37.90845038** **Longitude: -87.322731** **Well Diameter: 2 in** **Casing Type: Pvc** **Screen Length: 10 ft** **Top of Screen: 58.7 ft** **Total Depth: 68.7 ft** **Initial Depth to Water: 37.09 ft**	**Pump Type: Bladder** **Pump Intake From TOC: 63.7 ft** **Estimated Total Volume Pumped: 10200 ml** **Flow Cell Volume: 130 ml** **Final Flow Rate: 200 ml/min** **Final Draw Down: 0.01 ft**	**Instrument Used: Aqua TROLL 600** **Serial Number: 651965**

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 5	
5/8/2024 11:39 AM	00:00	5.63 pH	19.40 °C	2,740.3 µS/cm	6.51 mg/L	74.55 NTU	-144.0 mV	37.09 ft	200.00 ml/min
5/8/2024 11:42 AM	03:00	5.65 pH	19.26 °C	2,766.1 µS/cm	6.82 mg/L	76.23 NTU	-143.6 mV	37.10 ft	200.00 ml/min
5/8/2024 11:45 AM	06:00	5.66 pH	19.51 °C	2,796.3 µS/cm	6.77 mg/L	76.90 NTU	-143.6 mV	37.11 ft	200.00 ml/min
5/8/2024 11:48 AM	09:00	5.66 pH	19.32 °C	2,820.1 µS/cm	6.84 mg/L	79.30 NTU	-142.9 mV	37.10 ft	200.00 ml/min
5/8/2024 11:51 AM	12:00	5.65 pH	19.59 °C	2,844.0 µS/cm	6.55 mg/L	76.47 NTU	-142.5 mV	37.09 ft	200.00 ml/min
5/8/2024 11:54 AM	15:00	5.65 pH	19.36 °C	2,884.2 µS/cm	6.71 mg/L	76.87 NTU	-141.9 mV	37.08 ft	200.00 ml/min
5/8/2024 11:57 AM	18:00	5.65 pH	19.66 °C	2,897.0 µS/cm	6.77 mg/L	80.21 NTU	-141.4 mV	37.08 ft	200.00 ml/min
5/8/2024 12:00 PM	21:00	5.66 pH	19.43 °C	2,917.8 µS/cm	6.68 mg/L	75.99 NTU	-141.3 mV	37.08 ft	200.00 ml/min
5/8/2024 12:03 PM	24:00	5.65 pH	19.56 °C	2,936.2 µS/cm	6.45 mg/L	81.82 NTU	-140.8 mV	37.09 ft	200.00 ml/min
5/8/2024 12:06 PM	27:00	5.66 pH	19.34 °C	2,946.7 µS/cm	6.75 mg/L	84.13 NTU	-140.4 mV	37.09 ft	200.00 ml/min
5/8/2024 12:09 PM	30:00	5.65 pH	19.54 °C	2,962.3 µS/cm	6.59 mg/L	93.12 NTU	-139.7 mV	37.09 ft	200.00 ml/min
5/8/2024 12:12 PM	33:00	5.67 pH	19.49 °C	2,971.8 µS/cm	6.63 mg/L	91.81 NTU	-139.1 mV	37.10 ft	200.00 ml/min
5/8/2024 12:15 PM	36:00	5.66 pH	19.50 °C	2,982.5 µS/cm	6.52 mg/L	86.54 NTU	-138.8 mV	37.10 ft	200.00 ml/min
5/8/2024 12:18 PM	39:00	5.67 pH	19.55 °C	2,988.7 µS/cm	6.47 mg/L	94.23 NTU	-138.7 mV	37.11 ft	200.00 ml/min
5/8/2024 12:21 PM	42:00	5.67 pH	19.48 °C	2,997.1 µS/cm	6.61 mg/L	87.89 NTU	-138.0 mV	37.11 ft	200.00 ml/min

5/8/2024 12:24 PM	45:00	5.67 pH	19.57 °C	3,004.9 µS/cm	6.40 mg/L	82.25 NTU	-137.4 mV	37.13 ft	200.00 ml/min
5/8/2024 12:27 PM	48:00	5.67 pH	19.46 °C	3,007.6 µS/cm	6.53 mg/L	82.50 NTU	-137.2 mV	37.13 ft	200.00 ml/min
5/8/2024 12:30 PM	51:00	5.68 pH	19.72 °C	3,012.5 µS/cm	6.70 mg/L	91.67 NTU	-140.1 mV	37.10 ft	200.00 ml/min

Samples

Sample ID:	Description:

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 5/10/2024 2:27:37 PM
Project: Culley East (3)
Operator Name: Hayley Torres

Location Name: CCR-AP-11 **Well Diameter: 2 in** **Casing Type: Pvc** **Screen Length: 10 ft** **Top of Screen: 44.4 ft** **Total Depth: 54.4 ft** **Initial Depth to Water: 15.22 ft**	**Pump Type: Mp-50** **Pump Intake From TOC: 49.4 ft** **Estimated Total Volume Pumped: 1050 ml** **Flow Cell Volume: 130 ml** **Final Flow Rate: 25 ml/min** **Final Draw Down: 0.36 ft**	**Instrument Used: Aqua TROLL 600** **Serial Number: 651925**

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 5	
5/10/2024 2:27 PM	00:00	6.34 pH	19.24 °C	1,360.1 µS/cm	1.37 mg/L	336.45 NTU	-29.6 mV	15.22 ft	25.00 ml/min
5/10/2024 2:30 PM	03:00	6.33 pH	19.29 °C	1,359.2 µS/cm	1.04 mg/L	290.56 NTU	-27.8 mV		25.00 ml/min
5/10/2024 2:33 PM	06:00	6.33 pH	19.30 °C	1,348.3 µS/cm	0.92 mg/L	265.67 NTU	-27.3 mV		25.00 ml/min
5/10/2024 2:36 PM	09:00	6.32 pH	19.33 °C	1,360.6 µS/cm	0.89 mg/L	215.56 NTU	-26.9 mV		25.00 ml/min
5/10/2024 2:39 PM	12:00	6.31 pH	20.59 °C	1,338.6 µS/cm	0.83 mg/L	213.22 NTU	-28.8 mV	15.58 ft	25.00 ml/min
5/10/2024 2:42 PM	15:00	6.30 pH	21.82 °C	1,345.6 µS/cm	0.73 mg/L	199.96 NTU	-29.5 mV		25.00 ml/min
5/10/2024 2:45 PM	18:00	6.29 pH	22.24 °C	1,354.6 µS/cm	0.64 mg/L	161.26 NTU	-29.2 mV		25.00 ml/min
5/10/2024 2:48 PM	21:00	6.29 pH	21.67 °C	1,339.1 µS/cm	0.59 mg/L	117.67 NTU	-27.9 mV		25.00 ml/min
5/10/2024 2:51 PM	24:00	6.28 pH	22.22 °C	1,352.2 µS/cm	0.55 mg/L	101.81 NTU	-28.0 mV		25.00 ml/min
5/10/2024 2:54 PM	27:00	6.28 pH	22.25 °C	1,358.1 µS/cm	0.50 mg/L	96.22 NTU	-28.1 mV		25.00 ml/min
5/10/2024 2:57 PM	30:00	6.27 pH	22.39 °C	1,353.3 µS/cm	0.46 mg/L	89.89 NTU	-27.8 mV		25.00 ml/min
5/10/2024 3:00 PM	33:00	6.27 pH	22.57 °C	1,347.1 µS/cm	0.43 mg/L	91.46 NTU	-27.8 mV		25.00 ml/min
5/10/2024 3:03 PM	36:00	6.27 pH	22.95 °C	1,367.1 µS/cm	0.41 mg/L	72.80 NTU	-27.9 mV		25.00 ml/min
5/10/2024 3:06 PM	39:00	6.26 pH	21.58 °C	1,361.7 µS/cm	0.39 mg/L	75.78 NTU	-26.0 mV		25.00 ml/min
5/10/2024 3:09 PM	42:00	6.26 pH	21.43 °C	1,336.8 µS/cm	0.36 mg/L	88.40 NTU	-24.8 mV		25.00 ml/min

Samples

Sample ID:	Description:

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley T
CONTRACTOR	Atlas	SAMPLING DATE	5-8-24

Sampling Data:		Well Depth as Built:	65.0 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-1R	Well Depth Measured:	ft	Initial Depth To Water:	44.46 ft	Field Parameter Device:	
Start time:		Depth To Top Of Screen:	55.0 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	11:20	Depth To Bottom Of Scree	65.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	44.46				19.29	7.50	647.58	5.36	351	1030	
Sample ID:	CCR-AP-1R			Date:	5-8-24	Time:	11:20	QAQC Samples:			

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley T
CONTRACTOR	Atlas	SAMPLING DATE	5-8-24

Sampling Data:		Well Depth as Built:	46.0 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-2	Well Depth Measured:	ft	Initial Depth To Water:	30.73 ft	Field Parameter Device:	
Start time:		Depth To Top Of Screen:	36.0 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	10:20	Depth To Bottom Of Scree	46.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH mV / pH	Conduct-ivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	30.73				18.11	28.9 / 7.22	2201	4.54	9503	71.6	actual pH cut off

Sample ID:	CCR-AP-2	Date:	5-8-24	Time:	10:20	QAQC Samples:

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley T
CONTRACTOR	Atlas	SAMPLING DATE	5-7-24

Sampling Data:		Well Depth as Built:	45.0 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-3	Well Depth Measured:	ft	Initial Depth To Water:	37.12 ft	Field Parameter Device:	
Start time:		Depth To Top Of Screen:	35.0 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	1400	Depth To Bottom Of Scree	45.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity µS/cm	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	37.12				20.93	6.84	~~1583~~ 1582	5.07	138	-125.8	

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley Tolles
CONTRACTOR	Atlas	SAMPLING DATE	5-8-24

Sampling Data:		Well Depth as Built:	35.5 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-4	Well Depth Measured:	ft	Initial Depth To Water:	17.49 ft	Field Parameter Device:	
Start time:		Depth To Top Of Screen:	25.5 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	9:45	Depth To Bottom Of Scree	35.5 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	17.49				18.22	6.83	1261	4.85	30	-120.2	Only 1 1-L collected
Sample ID:	CCR-AP-4			Date:	5-8-24	Time:	9:45	QAQC Samples:			

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

HALEY ALDRICH

Page 1 of 1

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley T
CONTRACTOR	Atlas	SAMPLING DATE	5-14-24

Sampling Data:		Well Depth as Built:	44.0 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-5	Well Depth Measured:	ft	Initial Depth To Water:	11.99 ft	Field Parameter Device:	
Start time:	14:24	Depth To Top Of Screen:	34.0 ft	Depth Of Pump Intake:	39 ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:		Depth To Bottom Of Scree	44.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	5-13 Purged
0	11.99		160		18.31	7.11	2281	4.5	72	300.5	1 wv = 3.42 gal
3											purged 12:15 - 13:15
6											5gal/3min
9											100gal purged then sampled
12											Dup 1 Taken
15											
18											

Sample ID:	CCR-AP-5	Date:	5-13-24	Time:	13:17	QAQC Samples:	DUP-1

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley Tolley
CONTRACTOR	Atlas	SAMPLING DATE	5-11-2024

Sampling Data:		Well Depth as Built:	85.3 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-5I	Well Depth Measured:	ft	Initial Depth To Water:	13.78 ft	Field Parameter Device:	
Start time:	12:00	Depth To Top Of Screen:	75.3 ft	Depth Of Pump Intake:	80.5 ft	Tubing Present In Well:	☒ Yes ☐ No
Finish Time:	13:36	Depth To Bottom Of Scree	85.3 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	13.78		60	5760mL	20.26	6.74	2671	0.77	265	306.2	5/11 ~~Duplicate Taken~~ Sampling ruined by nearby construction equipment shaking ground
3					20.88	6.72	~~2683~~	0.59	1728	45.2	
6					21.45	6.72	2691	0.57	1077	21.0	
9	13.71				19.66	6.76	2688	1.90	669	48.0	
12					19.29	6.73	2698	1.55	325	62.7	Purging 5-13
15					19.17	6.73	2700	1.53	170	69.5	1wv = 11.65
18	13.84				19.49	6.72	2710	1.48	133	66.4	13:20 - 14:00
21					19.55	6.72	2711	1.38	124	55.7	5gal/3min
24					19.57	6.72	2714	1.33	115	47.5	purged 67 gal then sampled
27					19.59	6.72	2716	1.25	101	46.5	
30					19.61	6.71	2721	1.21	91	33.8	final data on page 3
33	13.85				19.61	6.71	2721	1.13	98	23.6	
36					19.54	6.71	2727	1.08	93	15.0	
39					19.56	6.71	2738	1.03	86	10.0	
42					19.47	6.71	2743	0.96	105	5.8	
45	13.89				19.48	6.71	2743	0.90	92	3.3	
48					19.51	6.71	2757	0.86	77	0.3	
51					19.45	6.71	2741	0.81	88	-2.5	
Sample ID:	CCR-AP-5I			Date:	5-11-24	Time:	14:30	QAQC Samples:			

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

Field Parameters

Well Number CCRAP-5I

	1	2	3	4	5	6	7
Time	54	57	60	63	66	69	72
PH (su)	6.71	6.71	6.71	6.71	6.71	6.71	6.71
Temp (C)	19.46	19.45	19.48	19.41	19.43	19.42	19.40
Conductivity	2731	2738	2720	2721	2711	2702	2679
D.O. (mg/L)	0.78	0.75	0.68	0.64	0.62	0.58	0.55
Turbidity (NTU)	90	80	88	95	95	92	88
ORP (mV)	-6.2	-9.7	-12.3	-16.0	-18.8	-22.0	-27.4
Water Lvl (DTW)	13.89			13.89			

Well Number

	1	2	3	4	5	6	7
Time	75	78	81	84	87	90	93
PH (su)	6.71	6.71	6.72	6.72	6.72	6.72	6.72
Temp (C)	19.45	19.33	19.33	19.50	19.39	19.39	19.37
Conductivity	2696	2693	2691	2722	2720	2726	2735
D.O. (mg/L)	0.51	0.51	0.48	0.57	0.44	0.42	0.40
Turbidity (NTU)	82	93	101	232	94	110	119
ORP (mV)	-27.9	-30.4	-32.4	-34.4	-35.8	-37.2	-38.3
Water Lvl (DTW)	13.89			13.89			13.89

Well Number

	1	2	3	4	5	6	7
Time	96						
PH (su)	6.72						
Temp (C)	19.36						
Conductivity	2741						
D.O. (mg/L)	0.39						
Turbidity (NTU)	95						
ORP (mV)	-38.6						
Water Lvl (DTW)							

Well Number

	1	2	3	4	5	6	7
Time							
PH (su)							
Temp (C)							
Conductivity							
D.O. (mg/L)							
Turbidity (NTU)							
ORP (mV)							
Water Lvl (DTW)							

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley T
CONTRACTOR	Atlas	SAMPLING DATE	5-13-24

Sampling Data:		Well Depth as Built:	85.3 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-5I	Well Depth Measured:	ft	Initial Depth To Water:	13.78 ft	Field Parameter Device:	
Start time:		Depth To Top Of Screen:	75.3 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☒ Yes ☐ No
Finish Time:	14:02	Depth To Bottom Of Scree	85.3 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0					18.21	6.72	2641	2.83	120	51.8	Final data purged for 40mins @ 5gal/3min 67 gal total
Sample ID:	CCR-AP-5I		Date:	5-13	Time:		14:02	QAQC Samples:			

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

HALEY ALDRICH

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley T
CONTRACTOR	Atlas	SAMPLING DATE	5-7-24

Sampling Data:		Well Depth as Built:	45.5 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-6	Well Depth Measured:	ft	Initial Depth To Water:	38.75 ft	Field Parameter Device:	
Start time:		Depth To Top Of Screen:	35.5 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	13:30	Depth To Bottom Of Scree	45.5 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity µS/cm	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	38.75				14.79	7.19	1105	3.65	93	-146.7	
Sample ID:	CCR-AP-6		Date:	5-7-24	Time:	13:30	QAQC Samples:				

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

HALEY ALDRICH

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Mayling T
CONTRACTOR	Atlas	SAMPLING DATE	5-7-24

Sampling Data:		Well Depth as Built:	74.7 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-6I	Well Depth Measured:	ft	Initial Depth To Water:	39.02 ft	Field Parameter Device:	
Start time:	12:24	Depth To Top Of Screen:	64.7 ft	Depth Of Pump Intake:	69.7 ft	Tubing Present In Well:	☒ Yes ☐ No
Finish Time:	12:51	Depth To Bottom Of Scree	74.7 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity µS (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
12:24	39.02	[illegible]	380		18.54	7.48	3396	6.75	1.86	241.1	
12:27	39.02				18.49	7.32	1694	0.47	6.64	-39.5	
12:30	39.02				18.13	7.30	1587	0.27	6.1	-54.7	
12:33	39.02				18.16	7.31	1559	0.21	8.1	-63.0	
12:36	39.02				18.18	7.33	1563	0.18	5.3	-69.0	
12:39	39.02				18.17	7.34	1570	0.17	4.1	-73.7	
12:42	39.02				18.14	7.35	1581	0.16	1.5	-76.8	
12:45	39.02				18.15	7.36	1621	0.15	1.5	-78.1	
12:48	39.02				18.23	7.36	1631	0.15	1.4	-78.2	
12:51	39.02			10260	18.20	7.367	1637	0.15	1.1	-78.3	
Sample ID:	CCR-AP-6I			Date:	5-7-24	Time:	13:15	QAQC Samples:			

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

HALEY ALDRICH

Page 1 of 1

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley Boller
CONTRACTOR	Atlas	SAMPLING DATE	5-10-2024

Sampling Data:		Well Depth as Built:	30.0 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-7	Well Depth Measured:	ft	Initial Depth To Water:	4.30 ft	Field Parameter Device:	
Start time:	10:20	Depth To Top Of Screen:	20.0 ft	Depth Of Pump Intake:	25 ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	11:08	Depth To Bottom Of Scree	30.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µS/cm or mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	4.30		25mL	1221mL	19.18	7.0	1056	4.74	66	157.9	
3					18.83	6.99	1063	3.87	44	153.3	
6					18.81	6.98	1076	3.46	43	149.2	
7					18.88	6.97	1078	3.36	44	148.3	← Ipad froze?
10	4.53				18.48	6.97	1077	3.15	52	144.6	
13					18.25	6.97	1073	3.01	65	141.0	
16					18.69	6.96	1087	2.91	84	136.2	
19					19.14	6.96	1092	2.81	110	132.2	
22					18.86	6.96	1072	3.01	27	127.0	
25					18.75	6.96	1070	2.81	22	122.0	
28	4.81				19.24	6.95	1067	2.69	30	118.7	
31					18.61	6.94	1084	2.71	52	113.7	
34					17.87	6.95	1075	3.34	19	111.5	
37					18.03	6.95	1079	2.89	23	99.1	
40					17.69	6.95	1071	2.81	22	78.2	
43					18.24	6.96	1081	2.79	26	62.7	
46	5.35				18.49	6.96	1075	2.72	34	58.3	
Sample ID:	CCR-AP-7			Date:	5-10-24	Time:	12:00	QAQC Samples:			

well volume = 3.14 (PI) x radius² x height of water column.

2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

Page | of

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley D
CONTRACTOR	Atlas	SAMPLING DATE	5-10-24

Sampling Data:		Well Depth as Built:	45.5 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-8	Well Depth Measured:	ft	Initial Depth To Water:	36.42 ft	Field Parameter Device:	
Start time:		Depth To Top Of Screen:	35.5 ft	Depth Of Pump Intake:	40.5 ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	15:30	Depth To Bottom Of Scree	45.5 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	36.42				18.56	6.90	1429	0.25	140	-76.3	

Sample ID:	CCR-AP-8	Date:	5-10-24	Time:	15:31	QAQC Samples:

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 l, 1L = 0.264 gal, 0.5l/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

HALEY ALDRICH

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Mikah B
CONTRACTOR	Atlas	SAMPLING DATE	5-8-24

Sampling Data:		Well Depth as Built:	68.7 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-8I	Well Depth Measured:	ft	Initial Depth To Water:	37.09 ft	Field Parameter Device:	
Start time:	1039	Depth To Top Of Screen:	58.7 ft	Depth Of Pump Intake:	63.7 ft	Tubing Present In Well:	☐ Yes ☐ No
Finish Time:	1130	Depth To Bottom Of Scree	68.7 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting ~~(ml/min)~~ or ~~(ml/min)~~ (gal/min)	Purge Rate ~~(ml/min)~~ or ~~(ml/min)~~ (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or ~~(°C)~~	pH	Conduct-ivity µS (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
1039	37.09	200mL	200mL	10200mL	19.40	5.63	2710.3	6.51	74.55	-144.0	
1042	37.10				19.26	5.65	2766.1	6.82	76.23	-143.6	
1045	37.11				19.61	5.66	2796.3	6.77	76.90	-143.6	
1048	37.10				19.32	5.66	2820.1	6.64	79.30	-142.9	
1051	37.09				19.59	5.65	2844.0	6.55	76.47	-142.5	
1054	37.08				19.36	5.65	2864.2	6.71	76.87	-141.9	
1057	37.08				19.66	5.65	2897.0	6.77	80.21	-141.4	
1100	37.08				19.43	5.66	2917.8	6.68	75.99	-141.3	
1103	37.09				19.56	5.65	2936.2	6.45	81.80	-140.8	
1106	37.09				19.34	5.66	2946.7	6.75	84.13	-140.4	
1109	37.09				19.54	5.65	2962.3	6.59	93.12	-139.7	
1112	37.10				19.49	5.67	2971.8	6.63	91.81	-139.1	
1115	37.10				19.50	5.66	2982.5	6.52	86.54	-138.8	
1118	37.11				19.55	5.67	2988.7	6.47	94.23	-138.7	
1121	37.11				19.48	5.67	2997.1	6.61	87.89	-138.0	
1124	37.13				19.59	5.67	3004.9	6.40	82.25	-137.4	
1127	37.13				19.46	5.67	3007.6	6.53	82.50	-137.2	
1130	37.10				19.72	5.68	3012.5	6.70	91.67	-140.1	
Sample ID:	CCR-AP-8I		Date:	5-8-24	Time:	11:40	QAQC Samples:				

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley Tolles
CONTRACTOR	Atlas	SAMPLING DATE	5-8-24

Sampling Data:		Well Depth as Built:	70.0 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-9	Well Depth Measured:	ft	Initial Depth To Water:	59.91 ft	Field Parameter Device:	
Start time:		Depth To Top Of Screen:	60.0 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	12:00	Depth To Bottom Of Scree	70.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	59.91				18.21	6.98	1165	4.44	464	65.6	ONLY 1 1-L taken

HALEY ALDRICH

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	Hayley T
CONTRACTOR	Atlas	SAMPLING DATE	

Sampling Data:		Well Depth as Built:	54.4 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-11	Well Depth Measured:	ft	Initial Depth To Water:	15.22 ft	Field Parameter Device:	
Start time:	13:27	Depth To Top Of Screen:	44.4 ft	Depth Of Pump Intake:	49.4 ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	14:09	Depth To Bottom Of Scree	54.4 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0	15.22		25	1050mL	19.24	6.34	1360	1.37	336	-29.6	
3					19.29	6.33	1359	1.04	290	-27.8	
6					19.30	6.33	1348	0.92	265	-27.3	
9					19.33	6.32	1360	0.89	215	-26.9	
12	15.58				20.59	6.31	1338	0.83	213	-28.8	
15					21.82	6.30	1345	0.73	199	-29.5	
18					22.24	6.29	1354	0.64	161	-29.2	
21					21.67	6.29	1339	0.59	117	-27.9	
24					22.22	6.28	1352	0.55	101	-28.0	
27					22.25	6.28	1358	0.50	96	-28.1	
30					22.39	6.27	1353	0.46	89	-27.8	
33					22.57	6.27	1347	0.43	91	-27.8	
36					22.95	6.27	1367	0.41	72	-27.9	
39					21.58	6.26	1361	0.39	75	-26.8	
42					21.43	6.26	1336	0.36	88	-27.8	

Sample ID:	CCR-AP-11	Date:	5-10-24	Time:	14:45	QAQC Samples:

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

CENTERPOINT ENERGY - FB CULLEY STATION
EAST ASH POND
CCR Groundwater Sampling Event
Gauging Date: November 11, 2024
Atlas Project No. 170LF01647

WELL ID	DATE	TIME	TOP OF CASING ELEVATION (FT-MSL)	DTW FROM TOC	STATIC WATER ELEVATION (FT-MSL)
East Ash Pond Wells					
CCR-AP-2	11/11/2024	16:31	394.02	39.60	354.42
CCR-AP-3R	Couldn't Locate/Not Gauged		394.55	-	-
CCR-AP-4R	11/11/2024	15:10	394.98	21.03	373.95
CCR-AP-5	11/11/2024	16:34	394.38	25.95	368.43
CCR-AP-5I	Damaged Pad, Cant Gauge		394.59	-	-
CCR-AP-6	11/11/2024	15:40	396.75	DRY TO SLEEVE (45.15)	<351.60
CCR-AP-6I	11/11/2024	15:35	396.88	58.45	338.43
CCR-AP-8	Couldn't Locate/Not Gauged		393.68	-	-
CCR-AP-8I	Couldn't Locate/Not Gauged		393.46	-	-
CCR-AP-11	11/11/2024	14:58	385.10	19.69	365.41
Background Wells					
CCR-AP-1R	11/11/2024	13:51	441.64	56.13	385.51
CCR-AP-7	11/11/2024	13:37	434.11	15.73	418.38
CCR-AP-9	11/11/2024	14:42	448.69	65.28	383.41

NOTES

DTW= Depth to Water

TOC= Top of Casing

What was originally thought to be the CCR-AP-8/8I nest during gauging on November 11, 2024 was actually an observation well nest.

CCR-AP-3 is believed to be covered under the excavation water management piping system. CCR-AP-8 and CCR-AP-8I were located by H&A and Atlas personnel under this equipment on November 14, 2024.

Low-Flow Test Report:

Test Date / Time: 11/14/2024 7:01:07 AM
Project: CULLEY EAST POND NOV 2024 GWM
Operator Name: M. BRETING

Location Name: CCR-AP-1R **Latitude:** **Longitude:** **Well Diameter: 2 in** **Casing Type: PVC** **Screen Length: 10 ft** **Top of Screen: 55 ft** **Total Depth: 65 ft** **Initial Depth to Water: 55.85 ft**	**Pump Type: Hydrasleeve** **Tubing Type: HDPE** **Flow Cell Volume: 130 ml** **Final Draw Down: 0 ft**	**Instrument Used: Aqua TROLL 500** **Serial Number: 625772**

Test Notes:

Weather Conditions:
Cloudy 52 degrees

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.3
11/14/2024 7:01 AM	00:00	5.13 pH	15.75 °C	132.12 µS/cm	9.71 mg/L	3,464.2 NTU	-8.8 mV	55.85 ft
11/14/2024 7:04 AM	03:00	5.19 pH	15.71 °C	150.15 µS/cm	9.69 mg/L	2,625.1 NTU	1.3 mV	55.85 ft
11/14/2024 7:07 AM	06:00	5.26 pH	15.67 °C	153.11 µS/cm	9.70 mg/L	1,792.4 NTU	9.7 mV	55.85 ft

Samples

Sample ID:	Description:
CCR-AP-1R	

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 11/14/2024 8:34:15 AM
Project: CULLEY EAST POND NOV 2024 GWM (2)
Operator Name: M. BRETING

Location Name: CCR-AP-2 **Latitude:** **Longitude:** **Well Diameter: 2 in** **Screen Length: 10 ft** **Top of Screen: 36 ft** **Total Depth: 46 ft**	**Pump Type: Hydrasleeve** **Tubing Type: HDPE** **Flow Cell Volume: 130 ml**	**Instrument Used: Aqua TROLL 500** **Serial Number: 625772**

Test Notes:

Weather Conditions:
Cloudy 55 degrees rain approaching

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.3
11/14/2024 8:34 AM	00:00	7.37 pH	14.20 °C	0.07 µS/cm	9.98 mg/L	0.00 NTU	50.5 mV	
11/14/2024 8:37 AM	03:00	7.35 pH	14.16 °C	0.07 µS/cm	9.98 mg/L	0.00 NTU	56.0 mV	
11/14/2024 8:40 AM	06:00	7.32 pH	14.14 °C	0.07 µS/cm	9.99 mg/L	0.00 NTU	60.6 mV	

Samples

Sample ID:	Description:
CCR-AP-2	

Low-Flow Test Report:

Test Date / Time: 11/14/2024 1:28:03 PM
Project: CULLEY EAST POND NOV 2024 GWM (7)
Operator Name: M. BRETING

Location Name: CCR-AP-4R **Latitude:** **Longitude:** **Well Diameter: 2 in** **Casing Type: PVC** **Screen Length: 10 ft** **Top of Screen: 25.5 ft** **Total Depth: 35.5 ft** **Initial Depth to Water: 20.56 ft**	**Pump Type: Hydrasleeve** **Tubing Type: HDPE** **Flow Cell Volume: 130 ml** **Final Draw Down: 0 ft**	**Instrument Used: Aqua TROLL 500** **Serial Number: 625772**

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.3
11/14/2024 1:28 PM	00:00	8.26 pH	14.24 °C	0.07 µS/cm	7.98 mg/L	0.01 NTU	136.9 mV	20.56 ft
11/14/2024 1:31 PM	03:00	8.27 pH	14.34 °C	0.07 µS/cm	4.93 mg/L	0.00 NTU	171.8 mV	20.56 ft
11/14/2024 1:34 PM	06:00	8.16 pH	14.39 °C	0.07 µS/cm	3.86 mg/L	0.00 NTU	188.5 mV	20.56 ft
11/14/2024 1:37 PM	09:00	8.09 pH	14.39 °C	0.07 µS/cm	3.53 mg/L	0.00 NTU	197.8 mV	20.56 ft
11/14/2024 1:40 PM	12:00	8.01 pH	14.36 °C	0.07 µS/cm	3.41 mg/L	0.00 NTU	204.4 mV	20.56 ft
11/14/2024 1:43 PM	15:00	7.95 pH	14.31 °C	0.07 µS/cm	3.36 mg/L	0.00 NTU	209.4 mV	20.56 ft

Samples

Sample ID:	Description:
CCR-AP-4R	

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 11/14/2024 2:46:26 PM
Project: CULLEY EAST POND NOV 2024 GWM (3)
Operator Name: M. BRETING

Location Name: CCR-AP-5 **Latitude:** **Longitude:** **Well Diameter: 2 in** **Casing Type: PVC** **Screen Length: 10 ft** **Top of Screen: 34.0 ft** **Total Depth: 44.0 ft** **Initial Depth to Water: 24.96 ft**	**Pump Type: SAMPLE PRO PORTABLE BLADDER PUMP** **Tubing Type: HDPE** **Pump Intake From TOC: 39.0 ft** **Estimated Total Volume Pumped: 11190 ml** **Flow Cell Volume: 130 ml** **Final Flow Rate: 200 ml/min** **Final Draw Down: 0.07 ft**	**Instrument Used: Aqua TROLL 500** **Serial Number: 625772**

Test Notes:

Weather Conditions:
Cloudy 55 degrees

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.3	
11/14/2024 2:46 PM	00:00	7.06 pH	15.36 °C	1,282.5 µS/cm	4.63 mg/L	468.05 NTU	-11.0 mV	25.01 ft	200.00 ml/min
11/14/2024 2:49 PM	03:00	7.07 pH	15.29 °C	1,276.1 µS/cm	4.17 mg/L	422.11 NTU	-18.5 mV	25.05 ft	200.00 ml/min
11/14/2024 2:52 PM	06:00	7.07 pH	15.26 °C	1,271.0 µS/cm	3.75 mg/L	394.92 NTU	-25.5 mV	25.05 ft	200.00 ml/min
11/14/2024 2:55 PM	09:00	7.07 pH	15.04 °C	1,264.9 µS/cm	3.42 mg/L	372.93 NTU	-30.6 mV		200.00 ml/min
11/14/2024 2:58 PM	12:00	7.07 pH	14.86 °C	1,260.1 µS/cm	3.12 mg/L	316.26 NTU	-36.3 mV		200.00 ml/min
11/14/2024 3:01 PM	15:00	7.07 pH	14.98 °C	1,258.2 µS/cm	2.82 mg/L	228.73 NTU	-41.1 mV	25.03 ft	200.00 ml/min
11/14/2024 3:04 PM	18:00	7.07 pH	14.96 °C	1,258.1 µS/cm	2.55 mg/L	167.47 NTU	-47.5 mV		200.00 ml/min
11/14/2024 3:07 PM	21:00	7.08 pH	14.93 °C	1,255.0 µS/cm	2.33 mg/L	157.91 NTU	-51.7 mV		200.00 ml/min
11/14/2024 3:10 PM	24:00	7.08 pH	15.00 °C	1,254.6 µS/cm	2.12 mg/L	96.64 NTU	-54.9 mV	25.03 ft	200.00 ml/min
11/14/2024 3:13 PM	27:00	7.08 pH	15.06 °C	1,253.1 µS/cm	1.91 mg/L	76.15 NTU	-56.3 mV		200.00 ml/min
11/14/2024 3:16 PM	30:00	7.08 pH	14.95 °C	1,250.5 µS/cm	1.75 mg/L	63.23 NTU	-57.7 mV		200.00 ml/min
11/14/2024 3:19 PM	33:00	7.08 pH	15.18 °C	1,249.9 µS/cm	1.57 mg/L	49.53 NTU	-59.7 mV	25.03 ft	200.00 ml/min
11/14/2024 3:22 PM	36:00	7.08 pH	15.17 °C	1,246.8 µS/cm	1.44 mg/L	33.96 NTU	-63.1 mV		200.00 ml/min

11/14/2024 3:25 PM	39:00	7.08 pH	15.11 °C	1,244.7 µS/cm	1.32 mg/L	36.93 NTU	-64.6 mV	25.03 ft	200.00 ml/min
11/14/2024 3:28 PM	42:00	7.08 pH	15.08 °C	1,242.4 µS/cm	1.20 mg/L	28.55 NTU	-66.5 mV		200.00 ml/min
11/14/2024 3:31 PM	45:00	7.08 pH	14.91 °C	1,240.3 µS/cm	1.09 mg/L	21.28 NTU	-67.1 mV		200.00 ml/min
11/14/2024 3:34 PM	48:00	7.08 pH	14.77 °C	1,238.6 µS/cm	1.00 mg/L	23.20 NTU	-68.6 mV	25.03 ft	200.00 ml/min
11/14/2024 3:37 PM	51:00	7.08 pH	14.69 °C	1,237.3 µS/cm	0.94 mg/L	10.18 NTU	-63.2 mV		200.00 ml/min
11/14/2024 3:40 PM	54:00	7.08 pH	14.55 °C	1,234.7 µS/cm	0.98 mg/L	12.24 NTU	-60.5 mV		200.00 ml/min
11/14/2024 3:42 PM	55:57	7.08 pH	14.45 °C	1,233.0 µS/cm	1.02 mg/L	11.21 NTU	-59.6 mV	25.03 ft	200.00 ml/min

Samples

Sample ID:	Description:
CCR-AP-5; DUP-1	

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 11/13/2024 9:20:06 AM
Project: CULLEY EAST POND NOV 2024 GWM
Operator Name: M. BRETING

Location Name: CCR-AP-6I **Latitude:** **Longitude:** **Well Diameter: 2 in** **Casing Type: PVC** **Screen Length: 10 ft** **Top of Screen: 64.7 ft** **Total Depth: 74.7 ft** **Initial Depth to Water: 58.53 ft**	**Pump Type: Dedicated** **Tubing Type: HDPE** **Pump Intake From TOC: 69.7 ft** **Estimated Total Volume Pumped: 6300 ml** **Flow Cell Volume: 130 ml** **Final Flow Rate: 350 ml/min** **Final Draw Down: 0.00 ft**	**Instrument Used: Aqua TROLL 500** **Serial Number: 625772**

Test Notes:

Weather Conditions:
Cloudy 50 degrees chance rain later today

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.3	
11/13/2024 9:20 AM	00:00	7.29 pH	19.35 °C	570.20 µS/cm	1.47 mg/L	0.04 NTU	-78.4 mV	58.53 ft	350.00 ml/min
11/13/2024 9:23 AM	03:00	7.34 pH	19.14 °C	483.29 µS/cm	0.46 mg/L	0.00 NTU	-50.3 mV		350.00 ml/min
11/13/2024 9:26 AM	06:00	7.34 pH	18.87 °C	475.73 µS/cm	0.56 mg/L	0.00 NTU	-37.8 mV	58.53 ft	350.00 ml/min
11/13/2024 9:29 AM	09:00	7.35 pH	19.24 °C	467.33 µS/cm	0.27 mg/L	0.12 NTU	-33.7 mV		350.00 ml/min
11/13/2024 9:32 AM	12:00	7.36 pH	19.18 °C	466.21 µS/cm	0.22 mg/L	0.00 NTU	-31.1 mV		350.00 ml/min
11/13/2024 9:35 AM	15:00	7.37 pH	19.23 °C	465.81 µS/cm	0.21 mg/L	0.00 NTU	-29.4 mV	58.53 ft	350.00 ml/min
11/13/2024 9:38 AM	18:00	7.38 pH	19.25 °C	465.25 µS/cm	0.20 mg/L	0.00 NTU	-28.6 mV	58.53 ft	350.00 ml/min

Samples

Sample ID:	Description:
CCR-AP-6I	

Low-Flow Test Report:

Test Date / Time: 11/14/2024 11:01:46 AM
Project: CULLEY EAST POND NOV 2024 GWM (6)
Operator Name: M. BRETING

Location Name: CCR-AP-9 **Latitude:** **Longitude:** **Casing Type: PVC** **Screen Length: 10 ft** **Top of Screen: 60 ft** **Total Depth: 70 ft**	**Pump Type: Hydrasleeve** **Tubing Type: HDPE** **Flow Cell Volume: 130 ml**	**Instrument Used: Aqua TROLL 500** **Serial Number: 625772**

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.3
11/14/2024 11:01 AM	00:00	8.43 pH	17.10 °C	1.67 µS/cm	6.26 mg/L	1,200.2 NTU	320.4 mV	
11/14/2024 11:04 AM	03:00	8.23 pH	17.08 °C	1.06 µS/cm	5.17 mg/L	940.50 NTU	313.9 mV	
11/14/2024 11:07 AM	06:00	8.15 pH	17.17 °C	0.74 µS/cm	5.01 mg/L	764.02 NTU	313.6 mV	

Samples

Sample ID:	Description:
CCR-AP-9	

Low-Flow Test Report:

Test Date / Time: 11/15/2024 7:03:17 AM
Project: CULLEY EAST POND NOV 2024 GWM (8)
Operator Name: M. BRETING

Location Name: CCR-AP-11 **Latitude:** **Longitude:** **Well Diameter: 2 in** **Casing Type: PVC** **Screen Length: 10 ft** **Top of Screen: 44.4 ft** **Total Depth: 54.4 ft** **Initial Depth to Water: 18.77 ft**	**Pump Type: SAMPLE PRO PORTABLE BLADDER PUMP** **Tubing Type: HDPE** **Pump Intake From TOC: 49.4 ft** **Estimated Total Volume Pumped: 5080.667 ml** **Flow Cell Volume: 130 ml** **Final Flow Rate: 50 ml/min** **Final Draw Down: 1.38 ft**	**Instrument Used: Aqua TROLL 500** **Serial Number: 625772**

Test Notes:
Drawdown stabilized

Weather Conditions:
Cloudy 45 degrees

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.3	
11/15/2024 7:03 AM	00:00	6.10 pH	13.42 °C	1,209.0 µS/cm	1.03 mg/L	188.20 NTU	-59.5 mV	19.30 ft	40.00 ml/min
11/15/2024 7:06 AM	03:00	6.10 pH	13.49 °C	1,204.7 µS/cm	1.05 mg/L	171.32 NTU	-58.0 mV		40.00 ml/min
11/15/2024 7:09 AM	06:00	6.10 pH	13.43 °C	1,200.1 µS/cm	1.06 mg/L	152.37 NTU	-56.1 mV	19.28 ft	40.00 ml/min
11/15/2024 7:12 AM	09:00	6.11 pH	13.35 °C	1,196.1 µS/cm	1.11 mg/L	130.31 NTU	-55.4 mV		40.00 ml/min
11/15/2024 7:13 AM	10:01	6.11 pH	13.31 °C	1,194.3 µS/cm	1.13 mg/L	124.84 NTU	-55.1 mV		40.00 ml/min
11/15/2024 7:16 AM	13:01	6.12 pH	13.17 °C	1,189.7 µS/cm	1.17 mg/L	123.15 NTU	-54.5 mV	19.26 ft	40.00 ml/min
11/15/2024 7:19 AM	16:01	6.12 pH	12.97 °C	1,185.1 µS/cm	1.23 mg/L	115.69 NTU	-53.7 mV		40.00 ml/min
11/15/2024 7:22 AM	19:01	6.12 pH	12.73 °C	1,179.7 µS/cm	1.29 mg/L	107.77 NTU	-51.0 mV	19.25 ft	40.00 ml/min
11/15/2024 7:25 AM	22:01	6.13 pH	12.47 °C	1,175.0 µS/cm	1.33 mg/L	102.99 NTU	-49.0 mV		40.00 ml/min
11/15/2024 7:28 AM	25:01	6.13 pH	12.19 °C	1,170.8 µS/cm	1.38 mg/L	107.52 NTU	-48.0 mV	19.20 ft	40.00 ml/min
11/15/2024 7:31 AM	28:01	6.11 pH	13.55 °C	1,175.2 µS/cm	1.32 mg/L	156.52 NTU	-49.6 mV		40.00 ml/min
11/15/2024 7:34 AM	31:01	6.12 pH	13.86 °C	1,178.7 µS/cm	1.27 mg/L	151.71 NTU	-54.4 mV		40.00 ml/min
11/15/2024 7:37 AM	34:01	6.14 pH	13.69 °C	1,174.6 µS/cm	1.33 mg/L	128.86 NTU	-54.4 mV		

11/15/2024 7:40 AM	37:01	6.26 pH	13.84 °C	1,173.5 µS/cm	3.87 mg/L	198.25 NTU	-51.3 mV		
11/15/2024 7:43 AM	40:01	6.21 pH	14.20 °C	791.51 µS/cm	3.65 mg/L	135.91 NTU	-52.7 mV		
11/15/2024 7:46 AM	43:01	6.24 pH	13.50 °C	1,163.4 µS/cm	3.78 mg/L	126.97 NTU	-49.5 mV	19.85 ft	40.00 ml/min
11/15/2024 7:49 AM	46:01	6.23 pH	13.25 °C	1,154.0 µS/cm	3.39 mg/L	117.30 NTU	-50.5 mV	19.78 ft	40.00 ml/min
11/15/2024 7:52 AM	49:01	6.22 pH	12.56 °C	1,145.4 µS/cm	2.82 mg/L	110.95 NTU	-51.6 mV	19.79 ft	40.00 ml/min
11/15/2024 7:55 AM	52:01	6.21 pH	12.11 °C	1,146.8 µS/cm	2.47 mg/L	115.74 NTU	-52.2 mV		50.00 ml/min
11/15/2024 7:58 AM	55:01	6.21 pH	12.03 °C	1,145.1 µS/cm	2.34 mg/L	115.28 NTU	-51.9 mV	19.95 ft	50.00 ml/min
11/15/2024 8:01 AM	58:01	6.21 pH	11.98 °C	1,141.8 µS/cm	2.35 mg/L	109.84 NTU	-51.0 mV	19.95 ft	50.00 ml/min
11/15/2024 8:04 AM	01:01:01	6.21 pH	12.59 °C	1,143.9 µS/cm	2.15 mg/L	92.72 NTU	-52.5 mV	19.87 ft	50.00 ml/min
11/15/2024 8:07 AM	01:04:01	6.22 pH	12.80 °C	1,140.0 µS/cm	2.08 mg/L	121.87 NTU	-51.7 mV		50.00 ml/min
11/15/2024 8:10 AM	01:07:01	6.23 pH	13.12 °C	1,139.9 µS/cm	1.77 mg/L	94.41 NTU	-55.8 mV		50.00 ml/min
11/15/2024 8:13 AM	01:10:01	6.25 pH	12.83 °C	1,134.5 µS/cm	1.61 mg/L	107.82 NTU	-56.9 mV	20.12 ft	50.00 ml/min
11/15/2024 8:16 AM	01:13:01	6.29 pH	12.40 °C	1,129.4 µS/cm	2.87 mg/L	121.12 NTU	-51.8 mV		50.00 ml/min
11/15/2024 8:19 AM	01:16:01	6.28 pH	12.35 °C	1,127.4 µS/cm	3.69 mg/L	132.89 NTU	-48.2 mV	20.13 ft	50.00 ml/min
11/15/2024 8:22 AM	01:19:01	6.28 pH	12.27 °C	1,123.5 µS/cm	3.57 mg/L	136.25 NTU	-48.1 mV		50.00 ml/min
11/15/2024 8:25 AM	01:22:01	6.28 pH	12.29 °C	1,122.6 µS/cm	3.19 mg/L	134.04 NTU	-49.4 mV	20.15 ft	50.00 ml/min
11/15/2024 8:28 AM	01:25:01	6.29 pH	12.30 °C	1,119.4 µS/cm	2.90 mg/L	112.55 NTU	-50.8 mV		50.00 ml/min
11/15/2024 8:31 AM	01:28:01	6.30 pH	12.19 °C	1,115.8 µS/cm	2.63 mg/L	98.48 NTU	-51.9 mV	20.15 ft	50.00 ml/min
11/15/2024 8:34 AM	01:31:01	6.30 pH	12.09 °C	1,112.6 µS/cm	2.34 mg/L	91.42 NTU	-53.0 mV		50.00 ml/min
11/15/2024 8:37 AM	01:34:01	6.31 pH	12.03 °C	1,110.8 µS/cm	2.13 mg/L	87.40 NTU	-54.0 mV		50.00 ml/min
11/15/2024 8:40 AM	01:37:01	6.31 pH	11.95 °C	1,108.6 µS/cm	1.99 mg/L	87.49 NTU	-54.5 mV	20.15 ft	50.00 ml/min
11/15/2024 8:43 AM	01:40:01	6.32 pH	11.90 °C	1,107.3 µS/cm	1.88 mg/L	95.71 NTU	-55.3 mV		50.00 ml/min
11/15/2024 8:46 AM	01:43:01	6.32 pH	11.91 °C	1,105.3 µS/cm	1.81 mg/L	99.77 NTU	-56.0 mV		50.00 ml/min
11/15/2024 8:49 AM	01:46:01	6.33 pH	11.89 °C	1,103.5 µS/cm	1.74 mg/L	86.53 NTU	-56.4 mV	20.15 ft	50.00 ml/min
11/15/2024 8:52 AM	01:49:01	6.33 pH	11.93 °C	1,103.0 µS/cm	1.69 mg/L	94.57 NTU	-56.9 mV		50.00 ml/min
11/15/2024 8:55 AM	01:52:01	6.33 pH	12.05 °C	1,102.9 µS/cm	1.63 mg/L	93.51 NTU	-57.5 mV	20.15 ft	50.00 ml/min

Samples

Sample ID:	Description:

CCR-AP-11	

Created using VuSitu from In-Situ, Inc.

HALEY ALDRICH

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	M. Gracey
CONTRACTOR	Atlas	SAMPLING DATE	11/14/24

Sampling Data:		Well Depth as Built:	65.0 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-1R	Well Depth Measured:	ft	Initial Depth To Water:	55.85 ft	Field Parameter Device:	Aquatroll 500
Start time:	0645	Depth To Top Of Screen:	55.0 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☐ No
Finish Time:	0650	Depth To Bottom Of Scree	65.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (ms/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
0701					15.75	5.13	132.12	9.71	3464.2	-8.8	
0704					15.71	5.19	150.15	9.69	2625.1	1.3	
0707					15.67	5.26	153.11	9.70	1792.4	9.7	
Sample ID:	CCR-AP-1R			Date:	11/14/24	Time:	0645	QAQC Samples:	—		

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

HALEY ALDRICH

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	M. Bratton
CONTRACTOR	Atlas	SAMPLING DATE	11/14/24

Sampling Data:		Well Depth as Built:	46.0 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-2	Well Depth Measured:	ft	Initial Depth To Water:	38.14 ft	Field Parameter Device:	Aquatroll 500
Start time:	08:05	Depth To Top Of Screen:	36.0 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☑ No
Finish Time:	08:20	Depth To Bottom Of Scree	46.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	~~Polyethylene~~ Hydrasleeve

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (ms/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
8:34					14.20	7.37	0.07	9.98	0.06	50.5	
8:37					14.16	7.35	0.07	9.88	0.00	56.0	
8:40					14.14	7.32	0.07	9.89	0.00	60.6	
Sample ID:	CCR-AP-2		Date:	11/14/24	Time:	0805	QAQC Samples:	—			

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

HALEY ALDRICH

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	M. Bacon
CONTRACTOR	Atlas	SAMPLING DATE	11/14/24

Sampling Data:		Well Depth as Built:	35.5 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-4	Well Depth Measured:	ft	Initial Depth To Water:	20.56 ft	Field Parameter Device:	Aqua TROLL 500
Start time:	13:20	Depth To Top Of Screen:	25.5 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☐ No
Finish Time:	13:30	Depth To Bottom Of Scree	35.5 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (ms/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
13:28					14.24	8.26	0.07	2.98	0.01	136.9	
13:31					14.34	8.27	0.07	4.93	0.00	171.8	
13:34					14.39	8.16	0.07	3.86	0.00	188.5	
13:37					14.39	8.09	0.07	3.53	0.00	197.8	
13:40					14.36	8.01	0.07	3.41	0.00	204.4	
13:43					14.31	7.95	0.07	3.36	0.00	209.4	
Sample ID:	CCR-AP-4R			Date:	11/14/24	Time:	1320	QAQC Samples:	—		

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L. 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

HALEY ALDRICH

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	M. Greving
CONTRACTOR	Atlas	SAMPLING DATE	11/14/24

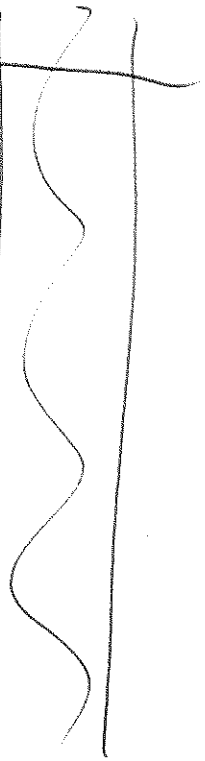
Sampling Data:		Well Depth as Built:	44.0 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-5	Well Depth Measured:	ft	Initial Depth To Water:	24.96 ft	Field Parameter Device:	Aquatroll 500
Start time:	1545	Depth To Top Of Screen:	34.0 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☒ No
Finish Time:	1625	Depth To Bottom Of Scree	44.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (ms/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
1446	25.01		200		15.36	7.06	1252.5	4.63	468.05	-11.0	
1449	25.05		200		15.29	7.07	1276.1	4.17	422.11	-18.5	
1452	25.05		200		15.26	7.07	1271.0	3.75	394.92	-25.5	
1455			200		15.04	7.07	1264.9	3.42	372.93	-30.6	
1458			200		14.86	7.07	1260.1	3.12	346.26	-36.3	
1501	25.03		200		14.98	7.07	1258.2	2.82	228.73	-41.1	
1504			200		14.96	7.07	1258.1	2.55	167.47	-47.5	
1507			200		14.93	7.08	1255.0	2.33	157.91	-51.7	
1510	25.03		200		15.00	7.08	1254.6	2.12	96.64	-54.9	
1513			200		15.06	7.08	1253.1	1.91	76.15	-56.3	
1516			200		14.95	7.08	1250.5	1.75	63.23	-57.7	
1519	25.03		200		15.18	7.08	1249.9	1.57	49.53	-59.2	DUP-1 collected at this well
1522			200		15.17	7.08	1246.8	1.44	33.96	-63.1	
1525	25.03		200		15.11	7.08	1244.7	1.32	36.93	-64.6	
1528			200		15.08	7.08	1242.4	1.20	28.55	-66.5	
1531			200		14.91	7.08	1240.3	1.09	21.28	-67.1	
1534	25.03		200		14.77	7.08	1238.6	1.00	23.20	-68.6	
1537			200		14.69	7.08	1237.3	0.94	10.18	-63.2	
Sample ID:	CCR-AP-5			Date:	11/14/24	Time:	1545	QAQC Samples:		DUP-1	

centrex 1

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

Time	DTW	Purge Rate	Cumul. Purge	T	pH	SpC	DO	Turb	ORP
						1234.7			
1540				14.55	7.08	~~1233.0~~	0.98	12.24	-60.5
1542	25.03		11190 ml	14.45	7.08	1233.0	1.02	11.21	-59.6



HALEY ALDRICH

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	M. BRETING
CONTRACTOR	Atlas	SAMPLING DATE	11/13/24

Sampling Data:		Well Depth as Built:	45.5 ft	Well Diameter:	2.0 in	Sampling Device:	Hydrasleeve
Well ID:	CCR-AP-6	Well Depth Measured:	ft	Initial Depth To Water:	Orq to 44.7 ft	Field Parameter Device:	—
Start time:		Depth To Top Of Screen:	35.5 ft	Depth Of Pump Intake:	(Top sleeve) ft	Tubing Present In Well:	☐ Yes ☐ No
Finish Time:		Depth To Bottom Of Scree	45.5 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (ms/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
	Orq to	44.7 ft									Orq to Total Depth
											Base by Hydrasleeve
											Packer by Hydrasleeve,
											confirmed no
											water present.
Sample ID:				Date:	11/13/24	Time:	0910	QAQC Samples:	—		

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

HALEY ALDRICH

LOW FLOW SAMPLING FORM

Page 1 of 1

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	M. Bratina
CONTRACTOR	Atlas	SAMPLING DATE	11/13/24

Sampling Data:		Well Depth as Built:	74.7 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-6I	Well Depth Measured:	ft	Initial Depth To Water:	58.53 ft	Field Parameter Device:	Aquatroll 500
Start time:	8:41	Depth To Top Of Screen:	64.7 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☑ Yes ☐ No
Finish Time:	8:52	Depth To Bottom Of Scree	74.7 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (ms/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
8 Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
8 ~~9:20~~ (8:41 custom Control Control)	58.53	~~350~~	350		19.35	7.29	570.20	1.47	0.54	-78.4	
8 9:23			350		19.14	7.34	453.29	0.46	0.00	-50.3	
8 9:26	58.53		350		18.87	7.34	475.73	0.56	0.00	-37.8	
8 9:29			350		19.24	7.35	467.33	0.27	0.12	-33.7	
8 9:32			350		19.19	7.36	466.21	0.22	0.00	-31.1	
8 9:35	58.53		350		19.23	7.37	465.81	0.21	0.00	-29.4	
X 8 9:38	58.53		350		19.25	7.38	465.25	0.20	0.00	-28.6	

Sample ID:	CCR-AP-6I	Date:	11/13/24	Time:	941	QAQC Samples:	—

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

(941 custom)

HALEY ALDRICH

LOW FLOW SAMPLING FORM

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	M. Bretz
CONTRACTOR	Atlas	SAMPLING DATE	11/14/24

Sampling Data:		Well Depth as Built:	70.0 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-9	Well Depth Measured:	ft	Initial Depth To Water:	65.06 ft	Field Parameter Device:	
Start time:	10:50	Depth To Top Of Screen:	60.0 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☐ No
Finish Time:	11:00	Depth To Bottom Of Scree	70.0 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (ms/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
11:01					17.10	8.43	1.67	6.26	1200.2	320.4	
11:04					17.28	8.23	1.06	5.17	940.50	313.9	
11:07					17.17	8.15	0.74	5.01	764.02	312.6	
Sample ID:	CCR-AP-9			Date:	11/14/24	Time:	1050	QAQC Samples:	—		

well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

HALEY ALDRICH

PROJECT	F.B. Culley Generating Station - East Ash Pond	H&A FILE NO.	0129420
LOCATION	Newburgh, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP.	M. Gretling
CONTRACTOR	Atlas	SAMPLING DATE	11/15/24

Sampling Data:		Well Depth as Built:	54.4 ft	Well Diameter:	2.0 in	Sampling Device:	Bladder Pump
Well ID:	CCR-AP-11	Well Depth Measured:	ft	Initial Depth To Water:	18.77 ft	Field Parameter Device:	
Start time:	0858	Depth To Top Of Screen:	44.4 ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☐ No
Finish Time:	11:10	Depth To Bottom Of Scree	54.4 ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Elapsed Time (24 hour)	Depth To Water From Casing (ft)	Pump Setting (ml/min) or (gal/min)	Purge Rate (ml/min) or (gal/min)	Cumulative Purge Vol. (liters) or (gal)	Temp-erature (°F) or (°C)	pH	Conduct-ivity (ms/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		-	NA	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
703	19.30		40		13.42	6.10	1209.0	1.03	188.20	-59.5	Initially set flow
706			40		13.49	6.10	1209.7	1.05	171.32	-58.0	To ~75 ml/min
709	19.28		40		13.43	6.10	1200.1	1.06	154.37	-56.1	Ch. G starting up Then
712			40		13.35	6.11	1196.1	1.11	130.35	-55.4	bleed down to ~40 ml/
Lost Communication at 10 minutes in, Re-established											min.
7:16	19.26		40		12.17	6.12	1189.7	1.17	123.15	-54.5	
7:19			40		12.97	6.12	1185.1	1.23	115.69	-53.7	
7:22	19.25		40		12.73	6.12	1179.7	1.29	107.77	-51.0	
7:25			40		12.47	6.13	1175.0	1.33	102.99	-49.0	
7:28	19.20		40		12.19	6.13	1170.8	1.38	107.52	-48.0	
7:31			40		13.55	6.11	1175.2	1.32	156.52	-49.6	
7:34			40		13.86	6.12	1178.7	1.27	151.71	-54.4	
Compressor 550 135 PSI - Readings between 734-744 should be ignored, no flow											
7:46	19.85		40		13.50	6.26	1163.4	3.78	126.97	-49.5	
7:49	19.78		40		13.25	6.23	1154.0	3.39	112.30	-50.5	
7:52	19.79		40		12.56	6.22	1145.4	2.82	110.95	-51.6	Field Blank 1
7:55			~~40~~ 50		12.11	6.21	1146.8	2.47	115.74	-52.2	Collected 1155 1155
7:58	~~19.84~~		50		12.03	6.21	1145.1	2.34	115.28	-51.9	near AP-11
Sample ID:	CCR-AP-11		Date:	11/15/24	Time:	08:58	QAQC Samples:	—			

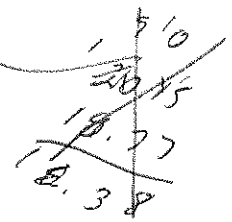
well volume = 3.14 (PI) x radius² x height of water column. 2 in well = 0.163 gal/ft, 3 in = ~~0.367 gal/ft~~, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

cdj cycle

19.95

CCR-AP-11

Time	OTW	Pump Setting	Purge Rate	Cumul Purge	T	pH	SpC	DO	Turb	ORP
8:01	19.95		50		11.98	6.21	1141.8	2.35	109.84	-51.0
8:04	19.87		50		12.59	6.21	1143.9	2.15	92.72	-52.5
8:07			50		12.50	6.22	1140.0	2.08	121.87	-51.7
Compressor stuck again 8:10 Reading			50		13.12	6.23	1139.9	1.77	94.41	-55.8
8:13	20.12		50		12.83	6.25	1134.5	1.61	132.82	-56.9
8:16			50		12.40	6.29	1129.4	2.87	121.82	-51.8
8:19	20.13		50		12.35	6.28	1127.4	3.69	132.89	-48.2
8:22			50		12.27	6.28	1123.5	3.57	136.25	-48.1
825	20.15		50		12.29	6.28	1122.6	3.19	134.04	-49.4
828			50		12.30	6.29	1119.4	2.90	112.55	-50.8
831	20.15		50		12.15	6.30	1115.8	2.63	98.48	-51.9



CCR
AP-11

	DTW	Purge Rate	Cumul Purge	T	pH	SpC	DO	Turb	ORP
834		50		12.09	6.30	1112.6	2.34	91.42	-53.0
837		50		12.03	6.31	1110.8	2.13	87.40	-54.0
840	20.15	50		11.95	6.31	1108.6	1.99	87.19	-54.5
843		50		11.90	6.32	1107.3	1.88	95.71	-55.3
846		50		11.91	6.32	1105.3	1.81	99.77	-56.0
849	20.15	50		11.89	6.33	1103.5	1.74	86.53	-56.4
852		50		11.93	6.33	1103.0	1.69	94.57	-56.9
855	20.15	50	5081 ml	12.05	6.33	1102.9	1.63	93.51	-57.5

HALEY ALDRICH

LOW FLOW SAMPLING FORM

Page 1 of 1

PROJECT	A.B. Brown Generating Station	**H&A FILE NO.**	0129420
LOCATION	Evansville, Indiana	**PROJECT MGR.**	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	**FIELD REP**	F. Reed
CONTRACTOR	N/A	**DATE**	12/19/24

Sampling Data:

Well ID:	CCR-AP-1R	Well Depth as Built:		ft	Well Diameter:	2	in	Purging Device:	Hydrasleeve
Start time:	11:00	Well Depth Measured:	65.76	ft	Initial Depth To Water:	59.62	ft	Field Parameter Device:	Horiba U-52
Finish Time:	12:20	Depth To Top Of Screen:		ft	Depth Of Pump Intake:	-	ft	Tubing Present In Well:	☐ Yes ☒ No
		Depth To Bottom Of Screen:		ft	Measuring Point:	Top of Casing (TOC)		Tubing Type:	N/A

Time (24 hour)	Depth to Water (ft TOC)	Pump Setting (mL/min)	Purge Rate (mL/min)	Cumulative Purge Volume (Liters)	Temperature (°F)	pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		--	N/A	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
* Grab sampled with a Hydrasleeve *											
12:00	-	-	-	-	17.08	6.89	1.03	1.75	>800	132	
											CCR-AP-1R-121924
											Sample Time: 11:40

well volume = 3.14 (PI) x radius^2 x height of water column 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

Form 3010

LOW FLOW SAMPLING FORM

PROJECT	A.B. Brown Generating Station	**H&A FILE NO.**	0129420
LOCATION	Evansville, Indiana	**PROJECT MGR.**	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	**FIELD REP**	F. Reed
CONTRACTOR	N/A	**DATE**	12/19/24

Sampling Data:

Well ID	CCR-AP-2	Well Depth as Built	ft	Well Diameter	2 in	Purging Device	Hydrasleeve		
Start time	13:35	Well Depth Measured	45.40 ft	Initial Depth To Water	35.78 ft	Field Parameter Device	Horiba U-52		
Finish Time	19:10	Depth To Top Of Screen	ft	Depth Of Pump Intake	– ft	Tubing Present In Well	☐ Yes ☒ No		
		Depth To Bottom Of Screen	ft	Measuring Point	Top of Casing (TOC)	Tubing Type	N/A		

Time (24 hour)	Depth to Water (ft TOC)	Pump Setting (mL/min)	Purge Rate (mL/min)	Cumulative Purge Volume (Liters)	Temperature (°F)	pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		--	N/A	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
	*	Grab sampled with a Hydrasleeve *									
19:05	–	–	–	–	15.88	6.28	2.01	1.80	341	27	
											CCR-AP-2-121924
											Sample Time: 13:50

well volume = 3.14 (PI) x radius^2 x height of water column 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

Form 3010

LOW FLOW SAMPLING FORM

PROJECT	A.B. Brown Generating Station	**H&A FILE NO.**	0129420
LOCATION	Evansville, Indiana	**PROJECT MGR.**	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	**FIELD REP**	F. Reed
CONTRACTOR	N/A	**DATE**	12/19/24

Sampling Data:

Well ID:	CCR-AP-4	Well Depth as Built:	ft	Well Diameter:	2 in	Purging Device:	Hydra sleeve
Start time:	12:30	Well Depth Measured:	35.03 ft	Initial Depth To Water:	21.65 ft	Field Parameter Device:	Horiba U-52
Finish Time:		Depth To Top Of Screen:	ft	Depth Of Pump Intake:	– ft	Tubing Present In Well:	☐ Yes ☒ No
		Depth To Bottom Of Screen:	ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	N/A

Time (24 hour)	Depth to Water (ft TOC)	Pump Setting (mL/min)	Purge Rate (mL/min)	Cumulative Purge Volume (Liters)	Temperature (°F)	pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		--	N/A	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
	* Grab Sampled with a Hydra sleeve *										
13:15	–	–	–	–	18.43	6.29	1.01	2.15	83.1	2.11	
											CCR-AP-4-121924
											Sample Time: 12:50

well volume = 3.14 (PI) x radius^2 x height of water column 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu ft = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW FLOW SAMPLING FORM

HALEY ALDRICH

PROJECT	A.B. Brown Generating Station	H&A FILE NO.	0129420
LOCATION	Evansville, Indiana	PROJECT MGR.	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	FIELD REP	F. Reed
CONTRACTOR	N/A	DATE	12/19/24

Sampling Data:

Well ID:	CCR-AP-5I	Well Depth as Built:	ft	Well Diameter:	2 in	Purging Device:	Tornado / Bladder
Start time:	16:12	Well Depth Measured:	85.40 ft	Initial Depth To Water:	25.93 ft	Field Parameter Device:	Horiba U-52
Finish Time:	19:00	Depth To Top Of Screen:	ft	Depth Of Pump Intake:	ft	Tubing Present In Well:	☐ Yes ☑ No
		Depth To Bottom Of Screen:	ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Time (24 hour)	Depth to Water (ft TOC)	Pump Setting (mL/min)	Purge Rate (mL/min)	Cumulative Purge Volume (Liters)	Temperature (°C)	pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Comments
Stabilized within →		[100 mL/min] to [500 mL/min]		--	N/A	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
*	Pumped 32 gallons out prior to taking parameters and sampling. 3 well volumes = 29.10 gallons *										
17:50	30.94	Set up dedicated pump									
17:58	31.05	-	200	1.0	16.50	6.68	2.32	1.13	394	20	
18:03	29.03	-	200	2.0	16.64	6.68	2.33	0.82	147	11	
18:08	28.52	-	200	3.0	16.70	6.67	2.34	0.43	134	2	
18:13	28.18	-	200	4.0	16.76	6.67	2.35	0.32	137	-1	
											CCR-AP-5I-121924
											Sample Time: 18:15

well volume = 3.14 (PI) x radius^2 x height of water column 2 in well = 0.163 gal/ft, 3 in = 0.367 gal/ft 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft, 1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

Form 3010

HALEY ALDRICH

LOW FLOW SAMPLING FORM

PROJECT	A.B. Brown Generating Station	**H&A FILE NO.**	0129420
LOCATION	Evansville, Indiana	**PROJECT MGR.**	Neal Kochis
CLIENT	Southern Indiana Gas and Electric Company	**FIELD REP**	F. Reed
CONTRACTOR	N/A	**DATE**	12/19/24

Sampling Data:

Well ID:	CCR-AP-8I	Well Depth as Built:	ft	Well Diameter:	2 in	Purging Device:	Bladder
Start time:	14:45	Well Depth Measured:	ft	Initial Depth To Water:	53.64 ft	Field Parameter Device:	Horiba U-52
Finish Time:	16:10	Depth To Top Of Screen:	ft	Depth Of Pump ~~Intake~~ Top:	60.90 ft	Tubing Present In Well:	☒ Yes ☐ No
		Depth To Bottom Of Screen:	ft	Measuring Point:	Top of Casing (TOC)	Tubing Type:	Polyethylene

Time (24 hour)	Depth to Water (ft TOC)	Pump Setting (mL/min)	Purge Rate (mL/min)	Cumulative Purge Volume (Liters)	Temperature (~~°F~~) (°C)	pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Comments
Stabilized within →		[100 mL/min] to	[500 mL/min]	--	N/A	[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	[+/- 10]	
15:13	53.64	–	400	~2.0	16.51	6.58	1.02	0.00	4.5	-137	
15:18	53.64	–	400	~4.0	16.76	6.60	0.769	0.00	0.7	-162	
15:23	53.64	–	400	6.0	16.77	6.59	0.756	0.00	0.0	-175	
15:28	53.64	–	400	8.0	16.74	6.57	0.754	0.00	0.0	-186	
15:33	53.64	–	400	10.0	16.70	6.57	0.752	0.00	0.0	-195	
15:38	53.64	–	400	12.0	16.73	6.58	0.752	0.00	0.0	-200	
15:43	53.64	–	400	14.00	16.79	6.58	0.751	0.00	0.0	-204	
											CCR-AP-8I - 121924
											Sample Time: 15:45
											~15 L Purged

well volume = 3.14 (PI) x radius^2 x height of water column; 2 in well = 0.163 gal/ft; 3 in = 0.367 gal/ft; 4 in = 0.653 gal/ft; 6 in = 1.469 gal/ft; 1 cu. ft. = 7.48 gal; 1 gal = 3.785 L; 1L = 0.264 gal; 0.5L/min = 0.132 gal/min

APPENDIX C
Laboratory Analytical Reports

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Todd Plating
Haley & Aldrich, Inc.
400 Augusta Street
Suite 100
Greenville, South Carolina 29601

Generated 1/26/2024 7:58:08 AM

JOB DESCRIPTION

CCR Groundwater Monitoring FB Culley East
FB Culley East

JOB NUMBER

180-167383-1

Eurofins Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh PA 15238

See page two for job notes and contact information.

my EOL

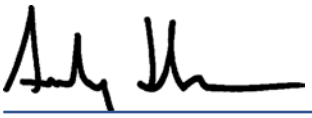
Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

PA Lab ID: 02-00416

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Pittsburgh Project Manager.

Authorization



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Authorized for release by
Andy Johnson, Senior Project Manager
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(615)818-9567

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Job ID: 180-167383-1 Eurofins Pittsburgh

Job Narrative
180-167383-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The sample was received on 12/23/2023 10:10 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.8°C

Receipt Exceptions
The container label for the following sample did not match the information listed on the Chain-of-Custody (COC): CCR-AP-1R (180-167383-1). The container labels list CCR-AP-1, while the COC lists CCR-AP-1R.

Gas Flow Proportional Counter
Method 9320_Ra228: Radium-228 batch 642707
The detection goal was not met for the following sample(s). Sample was prepped at a reduced volume due to the presence of matrix interferences: CCR-AP-1R (180-167383-1). Analytical results are reported with the detection limit achieved.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Definitions/Glossary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-167383-1
SDG: FB Culley East

Qualifiers

Rad

Qualifier	Qualifier Description
G	The Sample MDC is greater than the requested RL.
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Job ID: 180-167383-1
Project/Site: CCR Groundwater Monitoring FB Culley East
SDG: FB Culley East

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-24
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-24
Connecticut	State	PH-0241	03-31-25
Florida	NELAP	E87689	06-30-24
HI - RadChem Recognition	State	n/a	06-30-24
Illinois	NELAP	200023	11-30-24
Iowa	State	373	12-01-24
Kansas	NELAP	E-10236	10-31-24
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
Louisiana	NELAP	04080	06-30-22 *
Louisiana (All)	NELAP	04080	06-30-24
Louisiana (DW)	State	LA011	12-31-24
Maryland	State	310	09-30-24
Massachusetts	State	M-MO054	06-30-24
MI - RadChem Recognition	State	9005	06-30-24
Missouri	State	780	06-30-25
Nevada	State	MO000542020-1	07-31-24
New Jersey	NELAP	MO002	06-30-24
New Mexico	State	MO00054	06-30-24
New York	NELAP	11616	03-31-24
North Carolina (DW)	State	29700	07-31-24
North Dakota	State	R-207	06-30-24
Oklahoma	NELAP	9997	08-31-24
Oregon	NELAP	4157	09-01-24
Pennsylvania	NELAP	68-00540	02-28-24
South Carolina	State	85002001	06-30-24
Texas	NELAP	T104704193	07-31-24
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	P330-17-00028	05-18-26
Utah	NELAP	MO000542021-14	07-31-24
Virginia	NELAP	10310	06-15-25
Washington	State	C592	08-30-24
West Virginia DEP	State	381	01-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-167383-1
SDG: FB Culley East

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
180-167383-1	CCR-AP-1R	Water	12/22/23 12:25	12/23/23 10:10

Method Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-167383-1
SDG: FB Culley East

Method	Method Description	Protocol	Laboratory
9315	Radium-226 (GFPC)	SW846	EET SL
9320	Radium-228 (GFPC)	SW846	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-167383-1
SDG: FB Culley East

Client Sample ID: CCR-AP-1R

Date Collected: 12/22/23 12:25
Date Received: 12/23/23 10:10

Lab Sample ID: 180-167383-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			492.86 mL	1.0 g	642705	01/02/24 11:10	KAC	EET SL
Total/NA	Analysis	9315		1			645314	01/24/24 14:17	FLC	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			492.86 mL	1.0 g	642707	01/02/24 11:14	KAC	EET SL
Total/NA	Analysis	9320		1			644701	01/18/24 11:42	FLC	EET SL
	Instrument ID: GFPCRED									
Total/NA	Analysis	Ra226_Ra228		1			645161	01/24/24 15:58	SCB	EET SL
	Instrument ID: NOEQUIP									

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Analyst References:

Lab: EET SL

Batch Type: Prep

KAC = Kevin Cox

Batch Type: Analysis

FLC = Fernando Cruz

SCB = Sarah Bernsen

Client Sample ID: CCR-AP-1R
Date Collected: 12/22/23 12:25
Date Received: 12/23/23 10:10

Lab Sample ID: 180-167383-1
Matrix: Water

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	5.36		0.649	0.809	1.00	0.285	pCi/L	01/02/24 11:10	01/24/24 14:17	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.8*		*30 - 110*	*01/02/24 11:10*	*01/24/24 14:17*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	9.08	G	2.35	2.49	1.00	2.44	pCi/L	01/02/24 11:14	01/18/24 11:42	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.8*		*30 - 110*	*01/02/24 11:14*	*01/18/24 11:42*	*1*
Y Carrier	*37.4*		*30 - 110*	*01/02/24 11:14*	*01/18/24 11:42*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	14.4		2.44	2.62	5.00	2.44	pCi/L		01/24/24 15:58	1

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-642705/1-A
Matrix: Water
Analysis Batch: 645440

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 642705

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.03135	U	0.0829	0.0829	1.00	0.176	pCi/L	01/02/24 11:10	01/24/24 11:53	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.1*		*30 - 110*	*01/02/24 11:10*	*01/24/24 11:53*	*1*

Lab Sample ID: LCS 160-642705/2-A
Matrix: Water
Analysis Batch: 645441

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 642705

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	11.30		1.19	1.00	0.155	pCi/L	100	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*87.6*		*30 - 110*

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-642707/1-A
Matrix: Water
Analysis Batch: 644701

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 642707

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.05854	U	0.310	0.310	1.00	0.565	pCi/L	01/02/24 11:14	01/18/24 11:38	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.1*		*30 - 110*	*01/02/24 11:14*	*01/18/24 11:38*	*1*
Y Carrier	*78.9*		*30 - 110*	*01/02/24 11:14*	*01/18/24 11:38*	*1*

Lab Sample ID: LCS 160-642707/2-A
Matrix: Water
Analysis Batch: 644701

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 642707

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			9.29	10.58		1.41	1.00	0.505	pCi/L	114	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*87.6*		*30 - 110*
Y Carrier	*79.6*		*30 - 110*

QC Association Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-167383-1
SDG: FB Culley East

Rad

Prep Batch: 642705

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-167383-1	CCR-AP-1R	Total/NA	Water	PrecSep-21	
MB 160-642705/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-642705/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 642707

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-167383-1	CCR-AP-1R	Total/NA	Water	PrecSep_0	
MB 160-642707/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-642707/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax 412-963-2468

Chain of Custody Record

370472 eurofins Environment Testing

HARRISBURG PA

Client Information	Sampler: Hayley Torres	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No: 180-97701-17191.1
Client Contact: Mark Breting	Phone:	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin: IN	Page: Page 1 of 1
Company: Atlas Technical Consultants LLC	PWSID:			Job #:
Address: 7988 Centerpoint Drive Suite 100	Due Date Requested:			
City: Indianapolis	TAT Requested (days):			
State, Zip: IN, 46256	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 0129420-032-001-01			
Email: mark.breting@atcassociates.com	WO #: See Chain			
Project Name: CCR Groundwater Monitoring FB Culley	Project #: 18016014			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9040C, 9056A_ORGFM_28D	6020A, 7470A	2540C_Calcd - TDS by 2540C	9315_Ra226, 9320_Ra228	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	N	D		
CCR-AP-1R	12-22-23	12:25	G	W	N	N				✓	1	

180-167383 Chain of Custody

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological	☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements.

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1	Hayley Torres	12-22-23 / 13:30	ATLAS	Fedex	12-22-23 / 13:30	
2					12-23-23 1010	ED.TMG
3		Date/Time:			Date/Time.	

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021


434 MTW EXP 08/24
ORIGIN ID:GTYA (317) 313-8306
MARK BRETING
CENTER POINT ENERGY CULLEY
3711 DARLINGTON ROAD
NEWBURGH, IN 47630
UNITED STATES US
SHIP DATE: 19DEC23
ACTWGT: 33.00 LB MAN
CAD: 0128689/CAFE3511
TO SAMPLE RECEIVING
EUROFINS ENVIRONMENT TESTING NE
301 ALPHA DRIVE
RIDC PARK
PITTSBURGH PA 152382907
(412) 963-7058
INV:
PO:
REF:
DEPT:
RMA:
Uncorrected temp °C
Thermometer ID 4.4 21
CF -0.1 Initials DB
PT-WI-SR-001 effective 11/8/18
RT 634 1 13:30 A
FZ
7717 12.23
FedEx
TRK# 0221 6772 2900 7717
SATURDAY 1:30P
PRIORITY OVERNIGHT
XO AGCA
15238
PA-US
PIT
EXP 04/24


180-167383 Waybill

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No: 180-502839.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin: Indiana	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-167383-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 1/30/2024			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: CCR Groundwater Monitoring FB Culley East	Project #: 18016014			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9315_Ra226/PrecSep_21 Standard Target List	9320_Ra228/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
CCR-AP-1R (180-167383-1)	12/22/23	12:25 Eastern		Water			X	X	X	2	

Note: Since laboratory accreditations are subject to change, Eurofins Pittsburgh places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Pittsburgh laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Pittsburgh attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Pittsburgh.

Possible Hazard Identification *Unconfirmed*	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*** ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by: FEDEX	Date/Time:	Company	Received by: Sierra Woodington FEDEX	Date/Time: DEC 28 2023 0910	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

1/26/2024

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-167383-1
SDG Number: FB Culley East

Login Number: 167383
List Number: 1
Creator: Watson, Debbie

List Source: Eurofins Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-167383-1
SDG Number: FB Culley East

Login Number: 167383
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 12/28/23 11:06 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

PREPARED FOR

Attn: Todd Plating
Haley & Aldrich, Inc.
400 Augusta Street
Suite 100
Greenville, South Carolina 29601

Generated 6/14/2024 2:50:14 PM

JOB DESCRIPTION

CCR Groundwater Monitoring FB Culley East
FB Culley East

JOB NUMBER

180-173844-1

Eurofins Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh PA 15238

See page two for job notes and contact information.

my EOL

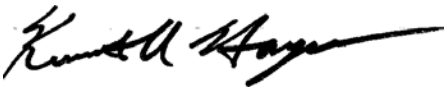
Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

PA Lab ID: 02-00416

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Pittsburgh Project Manager.

Authorization



Generated
6/14/2024 2:50:14 PM

Authorized for release by
Ken Hayes, Project Manager II
Ken.Hayes@et.eurofinsus.com
Designee for
Andy Johnson, Senior Project Manager
Andy.Johnson@et.eurofinsus.com
(615)818-9567

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Job Narrative
180-173844-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 5/10/2024 9:30 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 3.0°C, 4.0°C and 4.2°C.

Receipt Exceptions
The reference method requires samples to have a pH of less than 2. The following sample was received with a pH of 7: CCR-AP-2 (180-173844-2). The sample was adjusted to the appropriate pH in the laboratory.

Affected container:
A-2

This container was not received. CCR-AP-8I (180-173844-7)

A second 500mL unpreserved container was received for this sample.
CCR-AP-9 (180-173844-8)

The sample in this container is a different color than the sample material in the other containers.

CCR-AP-9 (180-173844-8)

The container label for the following sample container was collected on 5/8/2024 at 1200 but the COC says this sample was collected on 5/8/2024 at 1140. CCR-AP-9 (180-173844-8).

Sample containers are not completely filled. CCR-AP-4 (180-173844-4) and CCR-AP-9 (180-173844-8)

Gas Flow Proportional Counter
Method 9320_Ra228: Radium-228 prep batch 160-661792:

The detection goal was not met for the following samples due to the reduced sample volume attributed to the presence of matrix interferences: CCR-AP-1R (180-173844-1), CCR-AP-2 (180-173844-2) and CCR-AP-9 (180-173844-8) . Analytical results are reported with the detection limit achieved.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Job ID: 180-173844-2 Eurofins Pittsburgh

Job Narrative
180-173844-2

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 5/10/2024 9:30 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 3.0°C, 4.0°C and 4.2°C.

Receipt Exceptions
The reference method requires samples to have a pH of less than 2. The container for radiological testing for the following sample was received with a pH of 7: CCR-AP-2 (180-173844-2). This container was adjusted to the appropriate pH in the laboratory.

A second 500mL unpreserved container was received for this sample. CCR-AP-9 (180-173844-8)

The sample in one of the 500ml unpreserved containers is a different color than the sample material in the other containers. CCR-AP-9 (180-173844-8)

The container label for the following sample container shows that it was collected on 5/8/2024 at 1200 but the COC says this sample was collected on 5/8/2024 at 1140. CCR-AP-9 (180-173844-8).

Sample containers are not completely filled. CCR-AP-4 (180-173844-4) and CCR-AP-9 (180-173844-8)

Per client instruction, the ID for sample -7 was changed to CCR-AP-8I.

HPLC/IC
Method 9056A_ORGFM_28D: The following sample was diluted to bring the concentration of target analytes within the calibration range: CCR-AP-6I (180-173844-6). Elevated reporting limits (RLs) are provided.

Method 9056A_ORGFM_28D: The following samples were diluted due to the nature of the sample matrix: CCR-AP-1R (180-173844-1), CCR-AP-2 (180-173844-2), CCR-AP-8I (180-173844-7), (180-173881-D-1), (180-173881-D-1 MS) and (180-173881-D-1 MSD). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
Method 2540C_Calcd: Use of a larger volume of sample resulted in overload of the filter; therefore, a sample volume less than 100mL was utilized for this procedure and produced less than the 200mg dried residue specified by the SM 2540C Total Dissolved Solids reference method. The following samples were impacted: CCR-AP-1R (180-173844-1) and CCR-AP-2 (180-173844-2).

Method 2540C_Calcd: The sample did not reach a stable weight following 3 cycles of heating, cooling, and desiccation. The cycle 3 weight was used to calculate the Total Dissolved Solids for the sample result. CCR-AP-3 (180-173844-3) and CCR-AP-6I (180-173844-6)

Method 2540C_Calcd: The sample did not reach a stable weight following 3 cycles of heating, cooling, and desiccation. The cycle 3 weight was used to calculate the Total Dissolved Solids for the sample result. CCR-AP-2 (180-173844-2), CCR-AP-4

Job ID: 180-173844-2 (Continued) Eurofins Pittsburgh

(180-173844-4), CCR-AP-8I (180-173844-7) and CCR-AP-9 (180-173844-8)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Definitions/Glossary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
HF	Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.

Rad

Qualifier	Qualifier Description
G	The Sample MDC is greater than the requested RL.
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Laboratory: Eurofins Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-24
California	State	2891	04-30-24 *
Connecticut	State	PH-0688	09-30-24
Florida	NELAP	E871008	06-30-24
Georgia	State	PA 02-00416	04-30-25
Illinois	NELAP	004375	07-31-25
Kansas	NELAP	E-10350	01-31-25
Kentucky (UST)	State	162013	04-30-23 *
Kentucky (WW)	State	KY98043	12-31-24
Louisiana	NELAP	04041	06-30-22 *
Louisiana (All)	NELAP	04041	06-30-24
Maine	State	PA00164	03-06-26
Minnesota	NELAP	042-999-482	12-31-24
New Hampshire	NELAP	2030	04-04-24 *
New Jersey	NELAP	PA005	06-30-24
New York	NELAP	11182	04-01-25
North Carolina (WW/SW)	State	434	12-31-24
North Dakota	State	R-227	04-30-24 *
Oregon	NELAP	PA-2151	02-06-25
Pennsylvania	NELAP	02-00416	04-30-25
Rhode Island	State	LAO00362	01-01-25
South Carolina	State	89014	04-30-25
Texas	NELAP	T104704528	03-31-25
US Fish & Wildlife	US Federal Programs	058448	03-31-24 *
USDA	US Federal Programs	P330-16-00211	04-11-26
Utah	NELAP	PA001462019-8	05-31-24
Virginia	NELAP	10043	07-14-24
West Virginia DEP	State	142	01-31-25
Wisconsin	State	998027800	08-31-24

Laboratory: Eurofins Cleveland

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-28-25
Georgia	State	4062	02-27-25
Illinois	NELAP	200004	07-31-24
Iowa	State	421	06-01-25
Kentucky (UST)	State	112225	02-27-25
Kentucky (WW)	State	KY98016	12-30-24
Minnesota	NELAP	039-999-348	12-31-24
New Jersey	NELAP	OH001	06-30-24
New York	NELAP	10975	04-02-25
Ohio VAP	State	ORELAP 4062	02-27-25
Oregon	NELAP	4062	02-27-25
Pennsylvania	NELAP	68-00340	08-31-24
Texas	NELAP	T104704517-22-19	08-31-24
USDA	US Federal Programs	P330-18-00281	01-05-27
Virginia	NELAP	460175	09-14-24
West Virginia DEP	State	210	12-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Job ID: 180-173844-1
Project/Site: CCR Groundwater Monitoring FB Culley East
SDG: FB Culley East

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-08-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-24
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-24
Connecticut	State	PH-0241	03-31-25
Florida	NELAP	E87689	06-30-24
HI - RadChem Recognition	State	n/a	06-30-24
Illinois	NELAP	200023	11-30-24
Iowa	State	373	12-01-24
Kansas	NELAP	E-10236	10-31-24
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
Louisiana	NELAP	04080	06-30-22 *
Louisiana (All)	NELAP	04080	06-30-24
Louisiana (DW)	State	LA011	12-31-24
Maryland	State	310	09-30-24
Massachusetts	State	M-MO054	06-30-24
MI - RadChem Recognition	State	9005	06-30-24
Missouri	State	780	06-30-25
Nevada	State	MO00054	07-31-24
New Jersey	NELAP	MO002	06-30-24
New Mexico	State	MO00054	06-30-24
New York	NELAP	11616	03-31-25
North Carolina (DW)	State	29700	07-31-24
North Dakota	State	R-207	06-30-24
Oklahoma	NELAP	9997	08-31-24
Oregon	NELAP	4157	09-01-24
Pennsylvania	NELAP	68-00540	02-28-25
South Carolina	State	85002001	06-30-24
Texas	NELAP	T104704193	07-31-24
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	P330-17-00028	05-18-26
Utah	NELAP	MO00054	07-31-24
Virginia	NELAP	460230	06-15-25
Washington	State	C592	08-30-24
West Virginia DEP	State	381	10-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
180-173844-1	CCR-AP-1R	Water	05/08/24 11:20	05/10/24 09:30
180-173844-2	CCR-AP-2	Water	05/08/24 10:20	05/10/24 09:30
180-173844-3	CCR-AP-3	Water	05/07/24 14:00	05/10/24 09:30
180-173844-4	CCR-AP-4	Water	05/08/24 09:45	05/10/24 09:30
180-173844-5	CCR-AP-6	Water	05/07/24 13:30	05/10/24 09:30
180-173844-6	CCR-AP-6I	Water	05/07/24 13:15	05/10/24 09:30
180-173844-7	CCR-AP-8I	Water	05/08/24 11:40	05/10/24 09:30
180-173844-8	CCR-AP-9	Water	05/08/24 12:00	05/10/24 09:30

Method Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Method	Method Description	Protocol	Laboratory
9315	Radium-226 (GFPC)	SW846	EET SL
9320	Radium-228 (GFPC)	SW846	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Client Sample ID: CCR-AP-1R

Date Collected: 05/08/24 11:20
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		5	1 mL	1 mL	468668	05/15/24 17:58	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 04:12	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:36	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	468856	05/16/24 13:30	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 11:29	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 16:30	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	468592	05/14/24 14:01	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			503.71 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665614	06/10/24 16:48	SCB	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Prep	PrecSep_0			503.71 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665182	06/07/24 11:52	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-2

Date Collected: 05/08/24 10:20
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468668	05/15/24 22:53	AM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		10	1 mL	1 mL	468668	05/15/24 23:08	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 04:17	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:38	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	468856	05/16/24 13:30	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 11:30	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 16:25	SNR	EET PIT
	Instrument ID: OZ									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Client Sample ID: CCR-AP-2

Date Collected: 05/08/24 10:20
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	468592	05/14/24 14:01	LWM	EET PIT
Total/NA	Prep	PrecSep-21			508.03 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665590	06/10/24 16:39	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Prep	PrecSep_0			508.03 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665182	06/07/24 11:52	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-3

Date Collected: 05/07/24 14:00
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468504	05/15/24 05:12	M1D	EET PIT
	Instrument ID: INTEGRION									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 04:21	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:41	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	468856	05/16/24 13:30	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 11:31	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 17:37	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468587	05/14/24 13:45	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			751.56 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665297	06/10/24 19:02	SCB	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			751.56 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665182	06/07/24 11:52	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Client Sample ID: CCR-AP-4

Date Collected: 05/08/24 09:45
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468668	05/15/24 21:54	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 04:25	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:43	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	468856	05/16/24 13:30	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 11:36	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 17:33	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468592	05/14/24 14:01	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			750.32 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665297	06/10/24 19:03	SCB	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			750.32 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665182	06/07/24 11:52	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-6

Date Collected: 05/07/24 13:30
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468504	05/15/24 01:30	M1D	EET PIT
	Instrument ID: INTEGRION									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 04:38	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:46	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	468856	05/16/24 13:30	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 11:37	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 17:28	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468587	05/14/24 13:45	LWM	EET PIT
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Client Sample ID: CCR-AP-6

Date Collected: 05/07/24 13:30
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			751.17 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665297	06/10/24 19:03	SCB	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			751.17 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665181	06/07/24 11:39	SCB	EET SL
	Instrument ID: GFPCORANGE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-6I

Date Collected: 05/07/24 13:15
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468504	05/14/24 23:21	M1D	EET PIT
	Instrument ID: INTEGRION									
Total/NA	Analysis	EPA 9056A		10	1 mL	1 mL	468504	05/14/24 23:39	M1D	EET PIT
	Instrument ID: INTEGRION									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		5			613436	05/17/24 08:23	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:49	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	468856	05/16/24 13:30	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 11:38	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468300	05/11/24 10:21	BAB	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468587	05/14/24 13:45	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			998.97 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665297	06/10/24 19:03	SCB	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			998.97 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665181	06/07/24 13:04	SCB	EET SL
	Instrument ID: GFPCORANGE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-8I
Lab Sample ID: 180-173844-7

Date Collected: 05/08/24 11:40
Matrix: Water
Date Received: 05/10/24 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		2	1 mL	1 mL	468668	05/15/24 19:41	AM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		20	1 mL	1 mL	468668	05/15/24 19:56	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		5			613436	05/17/24 08:27	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:51	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	468856	05/16/24 13:30	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 11:39	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 17:23	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	468592	05/14/24 14:01	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			750.38 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665297	06/10/24 19:04	SCB	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			750.38 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665181	06/07/24 11:39	SCB	EET SL
	Instrument ID: GFPCORANGE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-9
Lab Sample ID: 180-173844-8

Date Collected: 05/08/24 12:00
Matrix: Water
Date Received: 05/10/24 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468668	05/15/24 22:24	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 04:56	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:54	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	468860	05/16/24 13:30	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 11:03	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468300	05/11/24 11:29	BAB	EET PIT
	Instrument ID: OZ									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173844-1
SDG: FB Culley East

Client Sample ID: CCR-AP-9

Date Collected: 05/08/24 12:00
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	468592	05/14/24 14:01	LWM	EET PIT
Total/NA	Prep	PrecSep-21			505.77 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1	1.0 mL	1.0 mL	665297	06/10/24 19:05	SCB	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			505.77 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665181	06/07/24 11:40	SCB	EET SL
	Instrument ID: GFPCORANGE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Analyst References:

Lab: EET CLE
- Batch Type: Prep
  - GK = Grace Kessler
- Batch Type: Analysis
  - KLC = Karen Counts
  - RKT = Roger Toth

Lab: EET PIT
- Batch Type: Prep
  - SJM = Shannon Mueller
- Batch Type: Analysis
  - AM = Adzuira Musule
  - BAB = Brooke Batyi
  - LWM = Leslie McIntire
  - M1D = Maureen Donlin
  - MTW = Michael Wesoloski
  - SNR = Sabra Richart

Lab: EET SL
- Batch Type: Prep
  - MLT = Michaela Tiemeyer
- Batch Type: Analysis
  - FLC = Fernando Cruz
  - SCB = Sarah Bernsen

Client Sample ID: CCR-AP-1R
Date Collected: 05/08/24 11:20
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-1
Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	32		5.0	3.6	mg/L			05/15/24 17:58	5
Fluoride	0.25	J	0.50	0.13	mg/L			05/15/24 17:58	5
Sulfate	100		5.0	3.8	mg/L			05/15/24 17:58	5

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.75		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 04:12	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.00073	J	0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:36	1
Arsenic	0.0059		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:36	1
Barium	0.35		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:36	1
Beryllium	0.00095	J	0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:36	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:36	1
Calcium	61		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:36	1
Chromium	0.021		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:36	1
Cobalt	0.013		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:36	1
Lead	0.013		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:36	1
Lithium	0.036		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:36	1
Molybdenum	0.0053		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:36	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:36	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:36	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:29	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	480		20	20	mg/L			05/14/24 14:01	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	7.4	HF	0.1	0.1	SU			05/13/24 16:30	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.32		0.485	0.528	1.00	0.289	pCi/L	05/15/24 09:14	06/10/24 16:48	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.1*		*30 - 110*	*05/15/24 09:14*	*06/10/24 16:48*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	4.98	G	1.26	1.34	1.00	1.35	pCi/L	05/15/24 09:17	06/07/24 11:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.1*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:52*	*1*

Client Sample ID: CCR-AP-1R
Lab Sample ID: 180-173844-1

Date Collected: 05/08/24 11:20
Matrix: Water
Date Received: 05/10/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*75.9*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**7.30**		1.35	1.44	5.00	1.35	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-2

Date Collected: 05/08/24 10:20
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-2

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	250		10	7.1	mg/L			05/15/24 23:08	10
Fluoride	0.27		0.10	0.026	mg/L			05/15/24 22:53	1
Sulfate	340		10	7.6	mg/L			05/15/24 23:08	10

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	8.1		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 04:17	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.0011	J	0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:38	1
Arsenic	0.025		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:38	1
Barium	0.83		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:38	1
Beryllium	0.0037		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:38	1
Cadmium	0.0030		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:38	1
Calcium	230		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:38	1
Chromium	0.11		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:38	1
Cobalt	0.048		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:38	1
Lead	0.056		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:38	1
Lithium	0.085		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:38	1
Molybdenum	0.0065		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:38	1
Selenium	0.0027	J	0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:38	1
Thallium	0.0010		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:38	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.00016	J	0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:30	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	1500		20	20	mg/L			05/14/24 14:01	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	6.7	HF	0.1	0.1	SU			05/13/24 16:25	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.65		0.417	0.442	1.00	0.351	pCi/L	05/15/24 09:14	06/10/24 16:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.1*		*30 - 110*	*05/15/24 09:14*	*06/10/24 16:39*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.57	G	0.840	0.852	1.00	1.16	pCi/L	05/15/24 09:17	06/07/24 11:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.1*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:52*	*1*

Client Sample ID: CCR-AP-2
Date Collected: 05/08/24 10:20
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-2
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*72.1*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**3.22**		0.938	0.960	5.00	1.16	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-3
Lab Sample ID: 180-173844-3

Date Collected: 05/07/24 14:00
Matrix: Water
Date Received: 05/10/24 09:30

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**27**		1.0	0.71	mg/L			05/15/24 05:12	1
Fluoride	**0.35**		0.10	0.026	mg/L			05/15/24 05:12	1
Sulfate	**32**		1.0	0.76	mg/L			05/15/24 05:12	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**0.28**		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 04:21	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:41	1
Arsenic	**0.051**		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:41	1
Barium	**0.38**		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:41	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:41	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:41	1
Calcium	**150**		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:41	1
Chromium	**0.0031**	**J**	0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:41	1
Cobalt	**0.0061**		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:41	1
Lead	**0.00097**	**J**	0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:41	1
Lithium	**0.0028**	**J**	0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:41	1
Molybdenum	**0.0093**		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:41	1
Selenium	**0.0016**	**J**	0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:41	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:41	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**730**		10	10	mg/L			05/14/24 13:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.1**	**HF**	0.1	0.1	SU			05/13/24 17:37	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.400**		0.176	0.180	1.00	0.183	pCi/L	05/15/24 09:14	06/10/24 19:02	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.1*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:02*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.495	U	0.459	0.461	1.00	0.722	pCi/L	05/15/24 09:17	06/07/24 11:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.1*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:52*	*1*

Client Sample ID: CCR-AP-3
Date Collected: 05/07/24 14:00
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-3
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*74.4*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.896**		0.492	0.495	5.00	0.722	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-4

Date Collected: 05/08/24 09:45
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-4

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**32**		1.0	0.71	mg/L			05/15/24 21:54	1
Fluoride	**0.61**		0.10	0.026	mg/L			05/15/24 21:54	1
Sulfate	**73**		1.0	0.76	mg/L			05/15/24 21:54	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**1.1**		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 04:25	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:43	1
Arsenic	**0.027**		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:43	1
Barium	**0.53**		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:43	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:43	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:43	1
Calcium	**130**		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:43	1
Chromium	ND		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:43	1
Cobalt	**0.0028**		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:43	1
Lead	ND		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:43	1
Lithium	**0.0045**	**J**	0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:43	1
Molybdenum	**0.017**		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:43	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:43	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:43	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:36	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**690**		10	10	mg/L			05/14/24 14:01	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.0**	**HF**	0.1	0.1	SU			05/13/24 17:33	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.337**		0.167	0.170	1.00	0.186	pCi/L	05/15/24 09:14	06/10/24 19:03	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.6*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:03*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.869	U	0.641	0.646	1.00	0.985	pCi/L	05/15/24 09:17	06/07/24 11:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.6*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:52*	*1*

Client Sample ID: CCR-AP-4
Date Collected: 05/08/24 09:45
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-4
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*75.5*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.21**		0.662	0.668	5.00	0.985	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-6

Date Collected: 05/07/24 13:30
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-5

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	36		1.0	0.71	mg/L			05/15/24 01:30	1
Fluoride	0.37		0.10	0.026	mg/L			05/15/24 01:30	1
Sulfate	46		1.0	0.76	mg/L			05/15/24 01:30	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.66		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 04:38	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.00082	J	0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:46	1
Arsenic	0.057		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:46	1
Barium	0.43		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:46	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:46	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:46	1
Calcium	110		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:46	1
Chromium	0.0027	J	0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:46	1
Cobalt	0.0034		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:46	1
Lead	0.0012		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:46	1
Lithium	0.0057	J	0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:46	1
Molybdenum	0.043		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:46	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:46	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:46	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	530		10	10	mg/L			05/14/24 13:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	7.2	HF	0.1	0.1	SU			05/13/24 17:28	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.541		0.228	0.233	1.00	0.274	pCi/L	05/15/24 09:14	06/10/24 19:03	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:03*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.169	U	0.446	0.446	1.00	0.789	pCi/L	05/15/24 09:17	06/07/24 11:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:39*	*1*

Client Sample ID: CCR-AP-6
Lab Sample ID: 180-173844-5

Date Collected: 05/07/24 13:30
Matrix: Water
Date Received: 05/10/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*78.9*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:39*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.710	U	0.501	0.503	5.00	0.789	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-6I

Date Collected: 05/07/24 13:15
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-6

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**87**		1.0	0.71	mg/L			05/14/24 23:21	1
Fluoride	**0.13**		0.10	0.026	mg/L			05/14/24 23:21	1
Sulfate	**430**		10	7.6	mg/L			05/14/24 23:39	10

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**15**		0.50	0.29	mg/L		05/15/24 14:00	05/17/24 08:23	5

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:49	1
Arsenic	**0.0057**		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:49	1
Barium	**0.041**		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:49	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:49	1
Cadmium	**0.00028**	**J**	0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:49	1
Calcium	**250**		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:49	1
Chromium	ND		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:49	1
Cobalt	**0.00062**	**J**	0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:49	1
Lead	ND		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:49	1
Lithium	**0.083**		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:49	1
Molybdenum	**0.86**		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:49	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:49	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:49	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:38	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1200**		10	10	mg/L			05/14/24 13:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.4**	**HF**	0.1	0.1	SU			05/11/24 10:21	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.159	U	0.114	0.115	1.00	0.161	pCi/L	05/15/24 09:14	06/10/24 19:03	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.0*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:03*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.536**		0.366	0.370	1.00	0.535	pCi/L	05/15/24 09:17	06/07/24 13:04	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.0*		*30 - 110*	*05/15/24 09:17*	*06/07/24 13:04*	*1*

Client Sample ID: CCR-AP-6I
Date Collected: 05/07/24 13:15
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-6
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*78.9*		*30 - 110*	*05/15/24 09:17*	*06/07/24 13:04*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.695**		0.383	0.387	5.00	0.535	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-8I

Date Collected: 05/08/24 11:40
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-7

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	180		2.0	1.4	mg/L			05/15/24 19:41	2
Fluoride	0.12	J	0.20	0.052	mg/L			05/15/24 19:41	2
Sulfate	1100		20	15	mg/L			05/15/24 19:56	20

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	33		0.50	0.29	mg/L		05/15/24 14:00	05/17/24 08:27	5

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:51	1
Arsenic	0.0013	J	0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:51	1
Barium	0.34		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:51	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:51	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:51	1
Calcium	490		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:51	1
Chromium	ND		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:51	1
Cobalt	0.00065	J	0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:51	1
Lead	ND		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:51	1
Lithium	0.17		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:51	1
Molybdenum	0.29		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:51	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:51	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:51	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	2400		20	20	mg/L			05/14/24 14:01	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	7.3	HF	0.1	0.1	SU			05/13/24 17:23	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.804		0.216	0.228	1.00	0.153	pCi/L	05/15/24 09:14	06/10/24 19:04	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.0*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:04*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.15		0.562	0.572	1.00	0.787	pCi/L	05/15/24 09:17	06/07/24 11:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.0*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:39*	*1*

Client Sample ID: CCR-AP-8I
Date Collected: 05/08/24 11:40
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-7
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*74.0*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:39*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.95**		0.602	0.616	5.00	0.787	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-9

Date Collected: 05/08/24 12:00
Date Received: 05/10/24 09:30

Lab Sample ID: 180-173844-8

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.6		1.0	0.71	mg/L			05/15/24 22:24	1
Fluoride	0.30		0.10	0.026	mg/L			05/15/24 22:24	1
Sulfate	130		1.0	0.76	mg/L			05/15/24 22:24	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.39		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 04:56	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:54	1
Arsenic	0.0039	J	0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:54	1
Barium	0.17		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:54	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:54	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:54	1
Calcium	130		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:54	1
Chromium	0.010		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:54	1
Cobalt	0.0061		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:54	1
Lead	0.0047		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:54	1
Lithium	0.038		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:54	1
Molybdenum	0.0017	J	0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:54	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:54	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:54	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:03	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	2400		20	20	mg/L			05/14/24 14:01	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	7.2	HF	0.1	0.1	SU			05/11/24 11:29	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	3.35		0.549	0.626	1.00	0.272	pCi/L	05/15/24 09:14	06/10/24 19:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.5*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:05*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.98	G	0.929	0.969	1.00	1.07	pCi/L	05/15/24 09:17	06/07/24 11:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.5*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:40*	*1*

Client Sample ID: CCR-AP-9
Lab Sample ID: 180-173844-8

Date Collected: 05/08/24 12:00
Matrix: Water
Date Received: 05/10/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*78.9*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:40*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**6.33**		1.08	1.15	5.00	1.07	pCi/L		06/12/24 08:25	1

Method: EPA 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 180-468504/45
Matrix: Water
Analysis Batch: 468504

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.71	mg/L			05/14/24 23:58	1
Fluoride	ND		0.10	0.026	mg/L			05/14/24 23:58	1
Sulfate	ND		1.0	0.76	mg/L			05/14/24 23:58	1

Lab Sample ID: MB 180-468504/6
Matrix: Water
Analysis Batch: 468504

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.71	mg/L			05/14/24 11:05	1
Fluoride	ND		0.10	0.026	mg/L			05/14/24 11:05	1
Sulfate	ND		1.0	0.76	mg/L			05/14/24 11:05	1

Lab Sample ID: LCS 180-468504/46
Matrix: Water
Analysis Batch: 468504

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	50.3		mg/L		101	80 - 120
Fluoride	2.50	2.52		mg/L		101	80 - 120
Sulfate	50.0	49.9		mg/L		100	80 - 120

Lab Sample ID: LCS 180-468504/7
Matrix: Water
Analysis Batch: 468504

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	50.0		mg/L		100	80 - 120
Fluoride	2.50	2.53		mg/L		101	80 - 120
Sulfate	50.0	49.7		mg/L		99	80 - 120

Lab Sample ID: MB 180-468668/6
Matrix: Water
Analysis Batch: 468668

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.71	mg/L			05/15/24 10:48	1
Fluoride	ND		0.10	0.026	mg/L			05/15/24 10:48	1
Sulfate	ND		1.0	0.76	mg/L			05/15/24 10:48	1

Lab Sample ID: LCS 180-468668/7
Matrix: Water
Analysis Batch: 468668

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	50.2		mg/L		100	80 - 120
Fluoride	2.50	2.49		mg/L		99	80 - 120
Sulfate	50.0	49.9		mg/L		100	80 - 120

Method: EPA 6010D - Metals (ICP)

Lab Sample ID: MB 240-613145/1-A
Matrix: Water
Analysis Batch: 613436

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 03:00	1

Lab Sample ID: LCS 240-613145/2-A
Matrix: Water
Analysis Batch: 613436

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1.00	1.04		mg/L		104	80 - 120

Method: EPA 6020B - Metals (ICP/MS)

Lab Sample ID: MB 240-613145/1-A
Matrix: Water
Analysis Batch: 613785

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 12:45	1
Arsenic	ND		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 12:45	1
Barium	ND		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 12:45	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 12:45	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 12:45	1
Calcium	ND		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 12:45	1
Chromium	ND		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 12:45	1
Cobalt	ND		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 12:45	1
Lead	ND		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 12:45	1
Lithium	ND		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 12:45	1
Molybdenum	ND		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 12:45	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 12:45	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 12:45	1

Lab Sample ID: LCS 240-613145/3-A
Matrix: Water
Analysis Batch: 613785

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.100	0.0942		mg/L		94	80 - 120
Arsenic	1.00	0.944		mg/L		94	80 - 120
Barium	1.00	0.933		mg/L		93	80 - 120
Beryllium	0.500	0.468		mg/L		94	80 - 120
Cadmium	0.500	0.479		mg/L		96	80 - 120
Calcium	25.0	24.5		mg/L		98	80 - 120
Chromium	0.500	0.481		mg/L		96	80 - 120
Cobalt	0.500	0.482		mg/L		96	80 - 120
Lead	0.500	0.488		mg/L		98	80 - 120
Lithium	0.500	0.518		mg/L		104	80 - 120
Molybdenum	0.500	0.469		mg/L		94	80 - 120
Selenium	1.00	0.951		mg/L		95	80 - 120
Thallium	1.00	0.970		mg/L		97	80 - 120

Method: EPA 7470A - Mercury (CVAA)

Lab Sample ID: MB 180-468856/1-A
Matrix: Water
Analysis Batch: 469200

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 468856

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 11:08	1

Lab Sample ID: LCS 180-468856/2-A
Matrix: Water
Analysis Batch: 469200

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 468856

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Mercury			0.00250	0.00260		mg/L		104	80 - 120		

Lab Sample ID: MB 180-468860/1-A
Matrix: Water
Analysis Batch: 469200

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 468860

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/16/24 13:30	05/20/24 10:35	1

Lab Sample ID: LCS 180-468860/2-A
Matrix: Water
Analysis Batch: 469200

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 468860

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Mercury			0.00250	0.00254		mg/L		101	80 - 120		

Method: EPA 9040C - pH

Lab Sample ID: LCS 180-468300/1
Matrix: Water
Analysis Batch: 468300

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
pH			7.00	7.0		SU		100	99 - 101		

Lab Sample ID: 180-173844-6 DU
Matrix: Water
Analysis Batch: 468300

Client Sample ID: CCR-AP-6I
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
pH	7.4	HF		7.4		SU				0.1	2

Lab Sample ID: LCS 180-468497/1
Matrix: Water
Analysis Batch: 468497

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
pH			7.00	7.0		SU		100	99 - 101		

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 180-468587/1
Matrix: Water
Analysis Batch: 468587

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			05/14/24 13:45	1

Lab Sample ID: LCS 180-468587/2
Matrix: Water
Analysis Batch: 468587

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	417	426		mg/L		102	85 - 115

Lab Sample ID: MB 180-468592/1
Matrix: Water
Analysis Batch: 468592

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			05/14/24 14:01	1

Lab Sample ID: LCS 180-468592/2
Matrix: Water
Analysis Batch: 468592

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	417	424		mg/L		102	85 - 115

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-661791/1-A
Matrix: Water
Analysis Batch: 665297

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 661791

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.01654	U	0.0608	0.0608	1.00	0.121	pCi/L	05/15/24 09:14	06/10/24 16:32	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.0*		*30 - 110*	*05/15/24 09:14*	*06/10/24 16:32*	*1*

Lab Sample ID: LCS 160-661791/2-A
Matrix: Water
Analysis Batch: 665297

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 661791

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-226	11.3	10.47		1.18	1.00	0.156	pCi/L	92	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*78.9*		*30 - 110*

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-661792/1-A
Matrix: Water
Analysis Batch: 665182

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 661792

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.5941		0.362	0.367	1.00	0.526	pCi/L	05/15/24 09:17	06/07/24 11:51	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.0*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:51*	*1*
Y Carrier	*77.4*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:51*	*1*

Lab Sample ID: LCS 160-661792/2-A
Matrix: Water
Analysis Batch: 665182

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 661792

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.87	10.19		1.45	1.00	0.679	pCi/L	115	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*78.9*		*30 - 110*
Y Carrier	*78.5*		*30 - 110*

HPLC/IC

Analysis Batch: 468504

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-3	CCR-AP-3	Total/NA	Water	EPA 9056A	
180-173844-5	CCR-AP-6	Total/NA	Water	EPA 9056A	
180-173844-6	CCR-AP-6I	Total/NA	Water	EPA 9056A	
180-173844-6	CCR-AP-6I	Total/NA	Water	EPA 9056A	
MB 180-468504/45	Method Blank	Total/NA	Water	EPA 9056A	
MB 180-468504/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-468504/46	Lab Control Sample	Total/NA	Water	EPA 9056A	
LCS 180-468504/7	Lab Control Sample	Total/NA	Water	EPA 9056A	

Analysis Batch: 468668

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total/NA	Water	EPA 9056A	
180-173844-2	CCR-AP-2	Total/NA	Water	EPA 9056A	
180-173844-2	CCR-AP-2	Total/NA	Water	EPA 9056A	
180-173844-4	CCR-AP-4	Total/NA	Water	EPA 9056A	
180-173844-7	CCR-AP-8I	Total/NA	Water	EPA 9056A	
180-173844-7	CCR-AP-8I	Total/NA	Water	EPA 9056A	
180-173844-8	CCR-AP-9	Total/NA	Water	EPA 9056A	
MB 180-468668/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-468668/7	Lab Control Sample	Total/NA	Water	EPA 9056A	

Metals

Prep Batch: 468856

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total/NA	Water	7470A	
180-173844-2	CCR-AP-2	Total/NA	Water	7470A	
180-173844-3	CCR-AP-3	Total/NA	Water	7470A	
180-173844-4	CCR-AP-4	Total/NA	Water	7470A	
180-173844-5	CCR-AP-6	Total/NA	Water	7470A	
180-173844-6	CCR-AP-6I	Total/NA	Water	7470A	
180-173844-7	CCR-AP-8I	Total/NA	Water	7470A	
MB 180-468856/1-A	Method Blank	Total/NA	Water	7470A	
LCS 180-468856/2-A	Lab Control Sample	Total/NA	Water	7470A	

Prep Batch: 468860

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-8	CCR-AP-9	Total/NA	Water	7470A	
MB 180-468860/1-A	Method Blank	Total/NA	Water	7470A	
LCS 180-468860/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 469200

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total/NA	Water	EPA 7470A	468856
180-173844-2	CCR-AP-2	Total/NA	Water	EPA 7470A	468856
180-173844-3	CCR-AP-3	Total/NA	Water	EPA 7470A	468856
180-173844-4	CCR-AP-4	Total/NA	Water	EPA 7470A	468856
180-173844-5	CCR-AP-6	Total/NA	Water	EPA 7470A	468856
180-173844-6	CCR-AP-6I	Total/NA	Water	EPA 7470A	468856
180-173844-7	CCR-AP-8I	Total/NA	Water	EPA 7470A	468856
180-173844-8	CCR-AP-9	Total/NA	Water	EPA 7470A	468860

Metals (Continued)

Analysis Batch: 469200 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 180-468856/1-A	Method Blank	Total/NA	Water	EPA 7470A	468856
MB 180-468860/1-A	Method Blank	Total/NA	Water	EPA 7470A	468860
LCS 180-468856/2-A	Lab Control Sample	Total/NA	Water	EPA 7470A	468856
LCS 180-468860/2-A	Lab Control Sample	Total/NA	Water	EPA 7470A	468860

Prep Batch: 613145

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total Recoverable	Water	3005A	
180-173844-2	CCR-AP-2	Total Recoverable	Water	3005A	
180-173844-3	CCR-AP-3	Total Recoverable	Water	3005A	
180-173844-4	CCR-AP-4	Total Recoverable	Water	3005A	
180-173844-5	CCR-AP-6	Total Recoverable	Water	3005A	
180-173844-6	CCR-AP-6I	Total Recoverable	Water	3005A	
180-173844-7	CCR-AP-8I	Total Recoverable	Water	3005A	
180-173844-8	CCR-AP-9	Total Recoverable	Water	3005A	
MB 240-613145/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-613145/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-613145/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 613436

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total Recoverable	Water	EPA 6010D	613145
180-173844-2	CCR-AP-2	Total Recoverable	Water	EPA 6010D	613145
180-173844-3	CCR-AP-3	Total Recoverable	Water	EPA 6010D	613145
180-173844-4	CCR-AP-4	Total Recoverable	Water	EPA 6010D	613145
180-173844-5	CCR-AP-6	Total Recoverable	Water	EPA 6010D	613145
180-173844-6	CCR-AP-6I	Total Recoverable	Water	EPA 6010D	613145
180-173844-7	CCR-AP-8I	Total Recoverable	Water	EPA 6010D	613145
180-173844-8	CCR-AP-9	Total Recoverable	Water	EPA 6010D	613145
MB 240-613145/1-A	Method Blank	Total Recoverable	Water	EPA 6010D	613145
LCS 240-613145/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6010D	613145

Analysis Batch: 613785

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total Recoverable	Water	EPA 6020B	613145
180-173844-2	CCR-AP-2	Total Recoverable	Water	EPA 6020B	613145
180-173844-3	CCR-AP-3	Total Recoverable	Water	EPA 6020B	613145
180-173844-4	CCR-AP-4	Total Recoverable	Water	EPA 6020B	613145
180-173844-5	CCR-AP-6	Total Recoverable	Water	EPA 6020B	613145
180-173844-6	CCR-AP-6I	Total Recoverable	Water	EPA 6020B	613145
180-173844-7	CCR-AP-8I	Total Recoverable	Water	EPA 6020B	613145
180-173844-8	CCR-AP-9	Total Recoverable	Water	EPA 6020B	613145
MB 240-613145/1-A	Method Blank	Total Recoverable	Water	EPA 6020B	613145
LCS 240-613145/3-A	Lab Control Sample	Total Recoverable	Water	EPA 6020B	613145

General Chemistry

Analysis Batch: 468300

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-6	CCR-AP-6I	Total/NA	Water	EPA 9040C	
180-173844-8	CCR-AP-9	Total/NA	Water	EPA 9040C	

General Chemistry (Continued)

Analysis Batch: 468300 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 180-468300/1	Lab Control Sample	Total/NA	Water	EPA 9040C	
180-173844-6 DU	CCR-AP-6I	Total/NA	Water	EPA 9040C	

Analysis Batch: 468497

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total/NA	Water	EPA 9040C	
180-173844-2	CCR-AP-2	Total/NA	Water	EPA 9040C	
180-173844-3	CCR-AP-3	Total/NA	Water	EPA 9040C	
180-173844-4	CCR-AP-4	Total/NA	Water	EPA 9040C	
180-173844-5	CCR-AP-6	Total/NA	Water	EPA 9040C	
180-173844-7	CCR-AP-8I	Total/NA	Water	EPA 9040C	
LCS 180-468497/1	Lab Control Sample	Total/NA	Water	EPA 9040C	

Analysis Batch: 468587

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-3	CCR-AP-3	Total/NA	Water	SM 2540C	
180-173844-5	CCR-AP-6	Total/NA	Water	SM 2540C	
180-173844-6	CCR-AP-6I	Total/NA	Water	SM 2540C	
MB 180-468587/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-468587/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 468592

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total/NA	Water	SM 2540C	
180-173844-2	CCR-AP-2	Total/NA	Water	SM 2540C	
180-173844-4	CCR-AP-4	Total/NA	Water	SM 2540C	
180-173844-7	CCR-AP-8I	Total/NA	Water	SM 2540C	
180-173844-8	CCR-AP-9	Total/NA	Water	SM 2540C	
MB 180-468592/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-468592/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Rad

Prep Batch: 661791

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total/NA	Water	PrecSep-21	
180-173844-2	CCR-AP-2	Total/NA	Water	PrecSep-21	
180-173844-3	CCR-AP-3	Total/NA	Water	PrecSep-21	
180-173844-4	CCR-AP-4	Total/NA	Water	PrecSep-21	
180-173844-5	CCR-AP-6	Total/NA	Water	PrecSep-21	
180-173844-6	CCR-AP-6I	Total/NA	Water	PrecSep-21	
180-173844-7	CCR-AP-8I	Total/NA	Water	PrecSep-21	
180-173844-8	CCR-AP-9	Total/NA	Water	PrecSep-21	
MB 160-661791/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-661791/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 661792

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-1	CCR-AP-1R	Total/NA	Water	PrecSep_0	
180-173844-2	CCR-AP-2	Total/NA	Water	PrecSep_0	
180-173844-3	CCR-AP-3	Total/NA	Water	PrecSep_0	

Rad (Continued)

Prep Batch: 661792 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173844-4	CCR-AP-4	Total/NA	Water	PrecSep_0	
180-173844-5	CCR-AP-6	Total/NA	Water	PrecSep_0	
180-173844-6	CCR-AP-6I	Total/NA	Water	PrecSep_0	
180-173844-7	CCR-AP-8I	Total/NA	Water	PrecSep_0	
180-173844-8	CCR-AP-9	Total/NA	Water	PrecSep_0	
MB 160-661792/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-661792/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

Virginia Beach Service Center

eurofins | Environment Testing

Client Information	Sampler: Hayley Torres	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No: 180-101847-14505.2
Client Contact: Mark Breting	Phone:	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin:	Page: Page 2 of 2
Company: Atlas Technical Consultants LLC	PWSID:	Analysis Requested		Job #:
Address: 7988 Centerpoint Drive Suite 100	Due Date Requested:			Preservation Codes: N - None, D - HNO3
City: Indianapolis	TAT Requested (days):			
State, Zip: IN, 46256	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 0129420-032-001-01			Other:
Email: mark.breting@atcassociates.com	WO #: See Chain			
Project Name: CCR GW Monitoring FB Culley East	Project #: 18016014			
Site: Culley East	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9040C, 9056A_ORGFM_28D	2540C_Calcd - TDS by 2540C	9315_Ra226, 9320_Ra228	6020B - Metals by 6020B	7470A - Hg by 7470A	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D	D	D		
CCR-AP-1R	5-8-24	11:20	G	W	N		X	X	X	X	X	6	
CCR-AP-2	5-8-24	10:20	G	W	N		X	X	X	X	X	6	
CCR-AP-3	5-7-24	14:00	G	W	N		X	X	X	X	X	6	
CCR-AP-4	5-8-24	9:45	G	W	N		X	X	X	X	X	5	1 1-L Bottle
CCR-AP-6	5-7-24	13:30	G	W	N		X	X	X	X	X	5	1 1-L Bottle
CCR-AP-6T	5-7-24	13:15	G	W	N		X	X	X	X	X	6	
CCR-AP-8	5-8-24	11:40	G	W	N		X	X	X	X	X	6	
CCR-AP-9	5-8-24	12:00	G	W	N		X	X	X	X	X	5	1 1-L Bottle

180-173844 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Hayley Torres	5-9-24 / 13:30	ATLAS	Fedex	5-9-24 / 13:30	
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact. Δ Yes Δ No	Custody Seal No :	Cooler Temperature(s) °C and Other Remarks.



CRAIG KAISER
FB CULLEY VECTREN CORPORATION
3711 DARLINGTON ROAD

NEWBURGH , IN 47630
UNITED STATES US

ACTWGT: 25.00 LB MAN
CAD: 0415933/CAFE3755

Part # 159469-434 MTW EXP 10/24

TO SAMPLE RECEIVING
EUROFINS
301 ALPHA DR

PITTSBURGH PA 15238
(412) 963-7058

INV:
PO:
REF:
DEPT:

RMA:

FedEx Express

FedEx
TRK# 0221 7236 3961 3920

FRI 10 MAY 10:30A
PRIORITY OVERNIGHT

Part # 156297-435 RRDW2 EXP 01/25

NX AGCA

15238
PA-US PIT

Uncorrected temp 5.0 C
Thermometer ID 123
CF -1.0 Initials TS

PT-WI-SR-001 effective 11/8/18

180-173844 Waybill



CRAIG KAISER
FB CULLEY VECTREN CORPORATION
3711 DARLINGTON ROAD

NEWBURGH , IN 47630
UNITED STATES US

ACTWGT: 25.00 LB MAN
CAD: 0415933/CAFE3755

Part # 159469-434 MTW EXP 10/24

585E/C137/9AE3

TO SAMPLE RECEIVING
EUROFINS
301 ALPHA DR

PITTSBURGH PA 15238
(412) 963-7058

INV:
PO:
REF:
DEPT:

RMA:

FedEx Express

FedEx
TRK# 0221 7236 3961 3941

FRI - 10 MAY 10:30A
PRIORITY OVERNIGHT

NX AGCA

15238
PA-US PIT

Part # 156297-435 RRDW2 EXP 01/25

Uncorrected temp 4.0 °C
Thermometer ID 27
CF -0.0 Initials TJ
PT-WI-SR-001 effective 11/8/[illegible]

#3923924 05/09 583J3/C137/9AE3

EUH

PITT

(412) 963-

RE:

RMA:

Uncorrected temp 4.4 °C

Thermometer ID 20

CF -0.2 Initials RD

PT-WI-SR-001 effective 11/8/18

FedEx

TRK# 0221 7236 3961 3930

FRI – 10 MAY 10:3

PRIORITY OVERNIGI

NX AGCA

1523

PA – US

#3923924 05/09 583J3/C137/9AE3

RT 198

FZ 197

10:30 A

3930

05 10

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6/14/2024

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No: 180-514536.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin: Indiana	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-173844-1
Address: 13715 Rider Trail North,	Due Date Requested: 6/13/2024			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: CCR Groundwater Monitoring FB Culley East	Project #: 18016014			
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9315_Ra226/PrecSep_21 Radium-226 (GFPC) by 9315 (21-day decay)	9320_Ra228/PrecSep_0 Radium-228 (GFPC) by 9320	Ra226Ra228_GFPC/ Combined Radium-226 and Radium-228	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
CCR-AP-1R (180-173844-1)	5/8/24	11:20 Eastern		Water			X	X	X	2	
CCR-AP-2 (180-173844-2)	5/8/24	10:20 Eastern		Water			X	X	X	2	
CCR-AP-3 (180-173844-3)	5/7/24	14:00 Eastern		Water			X	X	X	2	
CCR-AP-4 (180-173844-4)	5/8/24	09:45 Eastern		Water			X	X	X	1	
CCR-AP-6 (180-173844-5)	5/7/24	13:30 Eastern		Water			X	X	X	1	
CCR-AP-6I (180-173844-6)	5/7/24	13:15 Eastern		Water			X	X	X	2	
CCR-AP-8 (180-173844-7)	5/8/24	11:40 Eastern		Water			X	X	X	2	
CCR-AP-9 (180-173844-8)	5/8/24	12:00 Eastern		Water			X	X	X	1	

Other:

Note: Since laboratory accreditations are subject to change, Eurofins Pittsburgh places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Pittsburgh laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Pittsburgh attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Pittsburgh.

Possible Hazard Identification *Unconfirmed*	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*** ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by:	5-13-24 17:20	Eurofins	Received by: M. Pinette		
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: MAY 14 2024 0950	Company
Relinquished by:	Date/Time:	Company	Received by	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

6/14/2024

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-173844-1
SDG Number: FB Culley East

Login Number: 173844
List Number: 1
Creator: Abernathy, Eric L

List Source: Eurofins Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-173844-1
SDG Number: FB Culley East

Login Number: 173844
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 05/14/24 01:52 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

PREPARED FOR

Attn: Todd Plating
Haley & Aldrich, Inc.
400 Augusta Street
Suite 100
Greenville, South Carolina 29601

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JOB DESCRIPTION

CCR Groundwater Monitoring FB Culley East
FB Culley East

JOB NUMBER

180-174082-1

Eurofins Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh PA 15238

See page two for job notes and contact information.

my EOL

Eurofins Pittsburgh

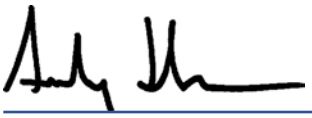
Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

PA Lab ID: 02-00416

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Pittsburgh Project Manager.

Authorization



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Authorized for release by
Andy Johnson, Senior Project Manager
Andy.Johnson@et.eurofinsus.com
(615)818-9567

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Job ID: 180-174082-1 Eurofins Pittsburgh

Job Narrative
180-174082-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 5/15/2024 9:35 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 4.3°C.

Gas Flow Proportional Counter
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Job ID: 180-174082-2 Eurofins Pittsburgh

Job Narrative
180-174082-2

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 5/15/2024 9:35 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 4.3°C.

HPLC/IC
Method 9056A_ORGFM_28D: The following samples were diluted due to the nature of the sample matrix: CCR-AP-5 (180-174082-1), CCR-AP-5I (180-174082-2), DUP 1 (180-174082-3), (180-174064-D-1), (180-174064-D-1 MS) and (180-174064-D-1 MSD). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals
Method 6020B - Total Recoverable: The continuing calibration verification (CCV) associated with batch 240-614112 recovered above the upper control limit for Beryllium and Antimony. The samples associated with this CCV were below the reporting limit for the affected analytes; therefore, the data have been reported. The associated samples are impacted: CCR-AP-5 (180-174082-1), CCR-AP-5I (180-174082-2) and DUP 1 (180-174082-3).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
Method 2540C_Calcd: The sample did not reach a stable weight following 3 cycles of heating, cooling, and desiccation. The cycle 3 weight was used to calculate the Total Dissolved Solids for the sample result. CCR-AP-5 (180-174082-1) and CCR-AP-5I (180-174082-2)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Definitions/Glossary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Qualifiers

Metals

Qualifier	Qualifier Description
^+	Continuing Calibration Verification (CCV) is outside acceptance limits, high biased.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
HF	Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Laboratory: Eurofins Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-24
California	State	2891	04-30-24 *
Connecticut	State	PH-0688	09-30-24
Florida	NELAP	E871008	06-30-24
Georgia	State	PA 02-00416	04-30-25
Illinois	NELAP	004375	07-31-25
Kansas	NELAP	E-10350	01-31-25
Kentucky (UST)	State	162013	04-30-23 *
Kentucky (WW)	State	KY98043	12-31-24
Louisiana	NELAP	04041	06-30-22 *
Louisiana (All)	NELAP	04041	06-30-24
Maine	State	PA00164	03-06-26
Minnesota	NELAP	042-999-482	12-31-24
New Hampshire	NELAP	2030	04-04-24 *
New Jersey	NELAP	PA005	06-30-24
New York	NELAP	11182	04-01-25
North Carolina (WW/SW)	State	434	12-31-24
North Dakota	State	R-227	04-30-24 *
Oregon	NELAP	PA-2151	02-06-25
Pennsylvania	NELAP	02-00416	04-30-25
Rhode Island	State	LAO00362	01-01-25
South Carolina	State	89014	04-30-25
Texas	NELAP	T104704528	03-31-25
US Fish & Wildlife	US Federal Programs	058448	03-31-24 *
USDA	US Federal Programs	P330-16-00211	04-11-26
Utah	NELAP	PA001462019-8	05-31-24
Virginia	NELAP	10043	07-14-24
West Virginia DEP	State	142	01-31-25
Wisconsin	State	998027800	08-31-24

Laboratory: Eurofins Cleveland

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-28-25
Georgia	State	4062	02-27-25
Illinois	NELAP	200004	07-31-24
Iowa	State	421	06-01-25
Kentucky (UST)	State	112225	02-27-25
Kentucky (WW)	State	KY98016	12-30-24
Minnesota	NELAP	039-999-348	12-31-24
New Jersey	NELAP	OH001	06-30-24
New York	NELAP	10975	04-02-25
Ohio VAP	State	ORELAP 4062	02-27-25
Oregon	NELAP	4062	02-27-25
Pennsylvania	NELAP	68-00340	08-31-24
Texas	NELAP	T104704517-22-19	08-31-24
USDA	US Federal Programs	P330-18-00281	01-05-27
Virginia	NELAP	460175	09-14-24
West Virginia DEP	State	210	12-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-08-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-24
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-24
Connecticut	State	PH-0241	03-31-25
Florida	NELAP	E87689	06-30-24
HI - RadChem Recognition	State	n/a	06-30-24
Illinois	NELAP	200023	11-30-24
Iowa	State	373	12-01-24
Kansas	NELAP	E-10236	10-31-24
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
Louisiana	NELAP	04080	06-30-22 *
Louisiana (All)	NELAP	04080	06-30-24
Louisiana (DW)	State	LA011	12-31-24
Maryland	State	310	09-30-24
Massachusetts	State	M-MO054	06-30-24
MI - RadChem Recognition	State	9005	06-30-24
Missouri	State	780	06-30-25
Nevada	State	MO00054	07-31-24
New Jersey	NELAP	MO002	06-30-24
New Mexico	State	MO00054	06-30-24
New York	NELAP	11616	03-31-25
North Carolina (DW)	State	29700	07-31-24
North Dakota	State	R-207	06-30-24
Oklahoma	NELAP	9997	08-31-24
Oregon	NELAP	4157	09-01-24
Pennsylvania	NELAP	68-00540	02-28-25
South Carolina	State	85002001	06-30-24
Texas	NELAP	T104704193	07-31-24
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	P330-17-00028	05-18-26
Utah	NELAP	MO00054	07-31-24
Virginia	NELAP	460230	06-14-25
Washington	State	C592	08-30-24
West Virginia DEP	State	381	10-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
180-174082-1	CCR-AP-5	Water	05/13/24 13:17	05/15/24 09:35
180-174082-2	CCR-AP-5I	Water	05/13/24 14:02	05/15/24 09:35
180-174082-3	DUP 1	Water	05/13/24 00:01	05/15/24 09:35

Method Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Method	Method Description	Protocol	Laboratory
9315	Radium-226 (GFPC)	SW846	EET SL
9320	Radium-228 (GFPC)	SW846	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Client Sample ID: CCR-AP-5

Date Collected: 05/13/24 13:17
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468830	05/16/24 15:08	AM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		10	1 mL	1 mL	468830	05/16/24 15:22	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6010D		5			615032	05/30/24 10:20	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			614112	05/22/24 20:26	AJC	EET CLE
	Instrument ID: I10									
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			614474	05/24/24 17:17	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	469069	05/18/24 10:45	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 14:17	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468847	05/16/24 10:09	BAB	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468906	05/16/24 16:46	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			750.57 mL	1.0 g	662403	05/20/24 08:11	MLT	EET SL
Total/NA	Analysis	9315		1			666559	06/17/24 22:59	SWS	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			750.57 mL	1.0 g	662405	05/20/24 08:15	MLT	EET SL
Total/NA	Analysis	9320		1			666560	06/17/24 12:34	SWS	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Analysis	Ra226_Ra228		1			666939	06/19/24 00:31	SCB	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-5I

Date Collected: 05/13/24 14:02
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468830	05/16/24 15:37	AM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		10	1 mL	1 mL	468830	05/16/24 15:52	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6010D		5			614072	05/22/24 17:44	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			614112	05/22/24 20:31	AJC	EET CLE
	Instrument ID: I10									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Client Sample ID: CCR-AP-5I

Date Collected: 05/13/24 14:02
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			614474	05/24/24 17:19	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	469069	05/18/24 10:45	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 14:18	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468847	05/16/24 10:14	BAB	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	468906	05/16/24 16:46	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			997.40 mL	1.0 g	662403	05/20/24 08:11	MLT	EET SL
Total/NA	Analysis	9315		1			666559	06/17/24 22:59	SWS	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			997.40 mL	1.0 g	662405	05/20/24 08:15	MLT	EET SL
Total/NA	Analysis	9320		1			666560	06/17/24 12:34	SWS	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Analysis	Ra226_Ra228		1			666939	06/19/24 00:31	SCB	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: DUP 1

Date Collected: 05/13/24 00:01
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468830	05/16/24 16:07	AM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		10	1 mL	1 mL	468830	05/16/24 16:21	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6010D		5			614072	05/22/24 17:48	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			614112	05/22/24 20:35	AJC	EET CLE
	Instrument ID: I10									
Total Recoverable	Prep	3005A			50 mL	50 mL	613656	05/21/24 05:00	TQ6W	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			614474	05/24/24 17:22	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	469069	05/18/24 10:45	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 14:19	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468847	05/16/24 10:20	BAB	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468906	05/16/24 16:46	LWM	EET PIT
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Client Sample ID: DUP 1

Date Collected: 05/13/24 00:01
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			752.80 mL	1.0 g	662403	05/20/24 08:11	MLT	EET SL
Total/NA	Analysis	9315		1			666740	06/18/24 07:43	SWS	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			752.80 mL	1.0 g	662405	05/20/24 08:15	MLT	EET SL
Total/NA	Analysis	9320		1	1.0 mL	1.0 mL	666560	06/17/24 12:34	SWS	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Analysis	Ra226_Ra228		1			666939	06/19/24 00:31	SCB	EET SL
	Instrument ID: NOEQUIP									

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Analyst References:

Lab: EET CLE
- Batch Type: Prep
  - TQ6W = Bryan Pere ka
- Batch Type: Analysis
  - AJC = Alexander Colosi
  - KLC = Karen Counts

Lab: EET PIT
- Batch Type: Prep
  - SJM = Shannon Mueller
- Batch Type: Analysis
  - AM = Adzuira Musule
  - BAB = Brooke Batyi
  - LWM = Leslie McIntire
  - MTW = Michael Wesoloski

Lab: EET SL
- Batch Type: Prep
  - MLT = Michaela Tiemeyer
- Batch Type: Analysis
  - SCB = Sarah Bernsen
  - SWS = Seth Stubblefield

Client Sample ID: CCR-AP-5
Lab Sample ID: 180-174082-1

Date Collected: 05/13/24 13:17
Matrix: Water
Date Received: 05/15/24 09:35

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**150**		1.0	0.71	mg/L			05/16/24 15:08	1
Fluoride	**0.84**		0.10	0.026	mg/L			05/16/24 15:08	1
Sulfate	**620**		10	7.6	mg/L			05/16/24 15:22	10

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**17**		0.50	0.29	mg/L		05/21/24 05:00	05/30/24 10:20	5

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	^+	0.0020	0.00057	mg/L		05/21/24 05:00	05/22/24 20:26	1
Arsenic	**0.00085**	**J**	0.0050	0.00075	mg/L		05/21/24 05:00	05/22/24 20:26	1
Barium	**0.046**		0.0050	0.0022	mg/L		05/21/24 05:00	05/22/24 20:26	1
Beryllium	ND	^+	0.0010	0.00062	mg/L		05/21/24 05:00	05/22/24 20:26	1
Cadmium	ND		0.0010	0.00020	mg/L		05/21/24 05:00	05/22/24 20:26	1
Calcium	**260**		1.0	0.25	mg/L		05/21/24 05:00	05/22/24 20:26	1
Chromium	**0.0020**	**J**	0.0050	0.0012	mg/L		05/21/24 05:00	05/22/24 20:26	1
Cobalt	**0.0025**		0.0010	0.00019	mg/L		05/21/24 05:00	05/22/24 20:26	1
Lead	**0.00068**	**J**	0.0010	0.00045	mg/L		05/21/24 05:00	05/22/24 20:26	1
Lithium	**0.056**		0.0080	0.0017	mg/L		05/21/24 05:00	05/24/24 17:17	1
Molybdenum	**0.15**		0.0050	0.0011	mg/L		05/21/24 05:00	05/22/24 20:26	1
Selenium	**0.00095**	**J**	0.0050	0.00089	mg/L		05/21/24 05:00	05/22/24 20:26	1
Thallium	ND		0.0010	0.00020	mg/L		05/21/24 05:00	05/22/24 20:26	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 14:17	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1600**		10	10	mg/L			05/16/24 16:46	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.1**	**HF**	0.1	0.1	SU			05/16/24 10:09	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.424**		0.283	0.286	1.00	0.366	pCi/L	05/20/24 08:11	06/17/24 22:59	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.4*		*30 - 110*	*05/20/24 08:11*	*06/17/24 22:59*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.452	U	0.507	0.509	1.00	0.830	pCi/L	05/20/24 08:15	06/17/24 12:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.4*		*30 - 110*	*05/20/24 08:15*	*06/17/24 12:34*	*1*

Client Sample ID: CCR-AP-5
Lab Sample ID: 180-174082-1

Date Collected: 05/13/24 13:17
Matrix: Water
Date Received: 05/15/24 09:35

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*86.4*		*30 - 110*	*05/20/24 08:15*	*06/17/24 12:34*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.877**		0.581	0.584	5.00	0.830	pCi/L		06/19/24 00:31	1

Client Sample ID: CCR-AP-5I
Date Collected: 05/13/24 14:02
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-2
Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**280**		10	7.1	mg/L			05/16/24 15:52	10
Fluoride	**0.32**		0.10	0.026	mg/L			05/16/24 15:37	1
Sulfate	**640**		10	7.6	mg/L			05/16/24 15:52	10

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**12**		0.50	0.29	mg/L		05/21/24 05:00	05/22/24 17:44	5

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	^+	0.0020	0.00057	mg/L		05/21/24 05:00	05/22/24 20:31	1
Arsenic	ND		0.0050	0.00075	mg/L		05/21/24 05:00	05/22/24 20:31	1
Barium	**0.027**		0.0050	0.0022	mg/L		05/21/24 05:00	05/22/24 20:31	1
Beryllium	ND	^+	0.0010	0.00062	mg/L		05/21/24 05:00	05/22/24 20:31	1
Cadmium	ND		0.0010	0.00020	mg/L		05/21/24 05:00	05/22/24 20:31	1
Calcium	**270**		1.0	0.25	mg/L		05/21/24 05:00	05/22/24 20:31	1
Chromium	ND		0.0050	0.0012	mg/L		05/21/24 05:00	05/22/24 20:31	1
Cobalt	**0.00051**	**J**	0.0010	0.00019	mg/L		05/21/24 05:00	05/22/24 20:31	1
Lead	ND		0.0010	0.00045	mg/L		05/21/24 05:00	05/22/24 20:31	1
Lithium	**0.035**		0.0080	0.0017	mg/L		05/21/24 05:00	05/24/24 17:19	1
Molybdenum	**0.0026**	**J**	0.0050	0.0011	mg/L		05/21/24 05:00	05/22/24 20:31	1
Selenium	ND		0.0050	0.00089	mg/L		05/21/24 05:00	05/22/24 20:31	1
Thallium	ND		0.0010	0.00020	mg/L		05/21/24 05:00	05/22/24 20:31	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 14:18	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1800**		20	20	mg/L			05/16/24 16:46	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**6.9**	**HF**	0.1	0.1	SU			05/16/24 10:14	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.249**		0.178	0.180	1.00	0.233	pCi/L	05/20/24 08:11	06/17/24 22:59	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.6*		*30 - 110*	*05/20/24 08:11*	*06/17/24 22:59*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.08**		0.424	0.435	1.00	0.549	pCi/L	05/20/24 08:15	06/17/24 12:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.6*		*30 - 110*	*05/20/24 08:15*	*06/17/24 12:34*	*1*

Client Sample ID: CCR-AP-5I
Date Collected: 05/13/24 14:02
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-2
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*92.3*		*30 - 110*	*05/20/24 08:15*	*06/17/24 12:34*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.33**		0.460	0.471	5.00	0.549	pCi/L		06/19/24 00:31	1

Client Sample ID: DUP 1

Date Collected: 05/13/24 00:01
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-3

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**160**		1.0	0.71	mg/L			05/16/24 16:07	1
Fluoride	**0.83**		0.10	0.026	mg/L			05/16/24 16:07	1
Sulfate	**640**		10	7.6	mg/L			05/16/24 16:21	10

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**17**		0.50	0.29	mg/L		05/21/24 05:00	05/22/24 17:48	5

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	^+	0.0020	0.00057	mg/L		05/21/24 05:00	05/22/24 20:35	1
Arsenic	ND		0.0050	0.00075	mg/L		05/21/24 05:00	05/22/24 20:35	1
Barium	**0.045**		0.0050	0.0022	mg/L		05/21/24 05:00	05/22/24 20:35	1
Beryllium	ND	^+	0.0010	0.00062	mg/L		05/21/24 05:00	05/22/24 20:35	1
Cadmium	ND		0.0010	0.00020	mg/L		05/21/24 05:00	05/22/24 20:35	1
Calcium	**260**		1.0	0.25	mg/L		05/21/24 05:00	05/22/24 20:35	1
Chromium	ND		0.0050	0.0012	mg/L		05/21/24 05:00	05/22/24 20:35	1
Cobalt	**0.0022**		0.0010	0.00019	mg/L		05/21/24 05:00	05/22/24 20:35	1
Lead	ND		0.0010	0.00045	mg/L		05/21/24 05:00	05/22/24 20:35	1
Lithium	**0.058**		0.0080	0.0017	mg/L		05/21/24 05:00	05/24/24 17:22	1
Molybdenum	**0.15**		0.0050	0.0011	mg/L		05/21/24 05:00	05/22/24 20:35	1
Selenium	ND		0.0050	0.00089	mg/L		05/21/24 05:00	05/22/24 20:35	1
Thallium	ND		0.0010	0.00020	mg/L		05/21/24 05:00	05/22/24 20:35	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 14:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1700**		10	10	mg/L			05/16/24 16:46	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.1**	**HF**	0.1	0.1	SU			05/16/24 10:20	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.182	U	0.181	0.181	1.00	0.269	pCi/L	05/20/24 08:11	06/18/24 07:43	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*30 - 110*	*05/20/24 08:11*	*06/18/24 07:43*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.983**		0.575	0.583	1.00	0.834	pCi/L	05/20/24 08:15	06/17/24 12:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*30 - 110*	*05/20/24 08:15*	*06/17/24 12:34*	*1*

Client Sample ID: DUP 1
Date Collected: 05/13/24 00:01
Date Received: 05/15/24 09:35

Lab Sample ID: 180-174082-3
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*82.2*		*30 - 110*	*05/20/24 08:15*	*06/17/24 12:34*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.17**		0.603	0.610	5.00	0.834	pCi/L		06/19/24 00:31	1

Method: EPA 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 180-468830/6
Matrix: Water
Analysis Batch: 468830

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.71	mg/L			05/16/24 11:07	1
Fluoride	ND		0.10	0.026	mg/L			05/16/24 11:07	1
Sulfate	ND		1.0	0.76	mg/L			05/16/24 11:07	1

Lab Sample ID: LCS 180-468830/7
Matrix: Water
Analysis Batch: 468830

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	49.7		mg/L		99	80 - 120
Fluoride	2.50	2.47		mg/L		99	80 - 120
Sulfate	50.0	49.4		mg/L		99	80 - 120

Method: EPA 6010D - Metals (ICP)

Lab Sample ID: MB 240-613656/1-A
Matrix: Water
Analysis Batch: 614072

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 613656

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.10	0.057	mg/L		05/21/24 05:00	05/22/24 15:34	1

Lab Sample ID: LCS 240-613656/2-A
Matrix: Water
Analysis Batch: 614072

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 613656

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1.00	1.03		mg/L		103	80 - 120

Method: EPA 6020B - Metals (ICP/MS)

Lab Sample ID: MB 240-613656/1-A
Matrix: Water
Analysis Batch: 614112

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 613656

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/21/24 05:00	05/22/24 19:13	1
Arsenic	ND		0.0050	0.00075	mg/L		05/21/24 05:00	05/22/24 19:13	1
Barium	ND		0.0050	0.0022	mg/L		05/21/24 05:00	05/22/24 19:13	1
Beryllium	ND		0.0010	0.00062	mg/L		05/21/24 05:00	05/22/24 19:13	1
Cadmium	ND		0.0010	0.00020	mg/L		05/21/24 05:00	05/22/24 19:13	1
Calcium	ND		1.0	0.25	mg/L		05/21/24 05:00	05/22/24 19:13	1
Chromium	ND		0.0050	0.0012	mg/L		05/21/24 05:00	05/22/24 19:13	1
Cobalt	ND		0.0010	0.00019	mg/L		05/21/24 05:00	05/22/24 19:13	1
Lead	ND		0.0010	0.00045	mg/L		05/21/24 05:00	05/22/24 19:13	1
Lithium	ND		0.0080	0.0017	mg/L		05/21/24 05:00	05/22/24 19:13	1
Molybdenum	ND		0.0050	0.0011	mg/L		05/21/24 05:00	05/22/24 19:13	1
Selenium	ND		0.0050	0.00089	mg/L		05/21/24 05:00	05/22/24 19:13	1
Thallium	ND		0.0010	0.00020	mg/L		05/21/24 05:00	05/22/24 19:13	1

Method: EPA 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 240-613656/3-A
Matrix: Water
Analysis Batch: 614112

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 613656

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.100	0.0932		mg/L		93	80 - 120
Arsenic	1.00	0.895		mg/L		89	80 - 120
Barium	1.00	0.875		mg/L		87	80 - 120
Beryllium	0.500	0.505		mg/L		101	80 - 120
Cadmium	0.500	0.443		mg/L		89	80 - 120
Calcium	25.0	22.2		mg/L		89	80 - 120
Chromium	0.500	0.461		mg/L		92	80 - 120
Cobalt	0.500	0.470		mg/L		94	80 - 120
Lead	0.500	0.484		mg/L		97	80 - 120
Lithium	0.500	0.499		mg/L		100	80 - 120
Molybdenum	0.500	0.455		mg/L		91	80 - 120
Selenium	1.00	0.904		mg/L		90	80 - 120
Thallium	1.00	0.907		mg/L		91	80 - 120

Method: EPA 7470A - Mercury (CVAA)

Lab Sample ID: MB 180-469069/1-A
Matrix: Water
Analysis Batch: 469200

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 469069

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 14:02	1

Lab Sample ID: LCS 180-469069/2-A
Matrix: Water
Analysis Batch: 469200

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 469069

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	0.00250	0.00239		mg/L		96	80 - 120

Method: EPA 9040C - pH

Lab Sample ID: LCS 180-468847/24
Matrix: Water
Analysis Batch: 468847

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
pH	7.00	7.0		SU		100	99 - 101

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 180-468906/1
Matrix: Water
Analysis Batch: 468906

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			05/16/24 16:46	1

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 180-468906/2
Matrix: Water
Analysis Batch: 468906

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	417	404		mg/L		97	85 - 115

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-662403/1-A
Matrix: Water
Analysis Batch: 666560

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 662403

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.07648	U	0.142	0.142	1.00	0.255	pCi/L	05/20/24 08:11	06/17/24 23:06	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.0*		*30 - 110*	*05/20/24 08:11*	*06/17/24 23:06*	*1*

Lab Sample ID: LCS 160-662403/2-A
Matrix: Water
Analysis Batch: 666560

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 662403

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-226	11.3	9.160		1.23	1.00	0.412	pCi/L	81	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*88.8*		*30 - 110*

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-662405/1-A
Matrix: Water
Analysis Batch: 666722

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 662405

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.1836	U	0.259	0.259	1.00	0.437	pCi/L	05/20/24 08:15	06/17/24 12:15	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.0*		*30 - 110*	*05/20/24 08:15*	*06/17/24 12:15*	*1*
Y Carrier	*86.0*		*30 - 110*	*05/20/24 08:15*	*06/17/24 12:15*	*1*

Lab Sample ID: LCS 160-662405/2-A
Matrix: Water
Analysis Batch: 666722

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 662405

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-228	8.84	9.439		1.29	1.00	0.535	pCi/L	107	75 - 125

Method: 9320 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-662405/2-A
Matrix: Water
Analysis Batch: 666722

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 662405

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	88.8		30 - 110
Y Carrier	85.2		30 - 110

HPLC/IC

Analysis Batch: 468830

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total/NA	Water	EPA 9056A	
180-174082-1	CCR-AP-5	Total/NA	Water	EPA 9056A	
180-174082-2	CCR-AP-5I	Total/NA	Water	EPA 9056A	
180-174082-2	CCR-AP-5I	Total/NA	Water	EPA 9056A	
180-174082-3	DUP 1	Total/NA	Water	EPA 9056A	
180-174082-3	DUP 1	Total/NA	Water	EPA 9056A	
MB 180-468830/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-468830/7	Lab Control Sample	Total/NA	Water	EPA 9056A	

Metals

Prep Batch: 469069

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total/NA	Water	7470A	
180-174082-2	CCR-AP-5I	Total/NA	Water	7470A	
180-174082-3	DUP 1	Total/NA	Water	7470A	
MB 180-469069/1-A	Method Blank	Total/NA	Water	7470A	
LCS 180-469069/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 469200

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total/NA	Water	EPA 7470A	469069
180-174082-2	CCR-AP-5I	Total/NA	Water	EPA 7470A	469069
180-174082-3	DUP 1	Total/NA	Water	EPA 7470A	469069
MB 180-469069/1-A	Method Blank	Total/NA	Water	EPA 7470A	469069
LCS 180-469069/2-A	Lab Control Sample	Total/NA	Water	EPA 7470A	469069

Prep Batch: 613656

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total Recoverable	Water	3005A	
180-174082-2	CCR-AP-5I	Total Recoverable	Water	3005A	
180-174082-3	DUP 1	Total Recoverable	Water	3005A	
MB 240-613656/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-613656/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-613656/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 614072

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-2	CCR-AP-5I	Total Recoverable	Water	EPA 6010D	613656
180-174082-3	DUP 1	Total Recoverable	Water	EPA 6010D	613656
MB 240-613656/1-A	Method Blank	Total Recoverable	Water	EPA 6010D	613656
LCS 240-613656/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6010D	613656

Analysis Batch: 614112

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total Recoverable	Water	EPA 6020B	613656
180-174082-2	CCR-AP-5I	Total Recoverable	Water	EPA 6020B	613656
180-174082-3	DUP 1	Total Recoverable	Water	EPA 6020B	613656
MB 240-613656/1-A	Method Blank	Total Recoverable	Water	EPA 6020B	613656
LCS 240-613656/3-A	Lab Control Sample	Total Recoverable	Water	EPA 6020B	613656

QC Association Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-174082-1
SDG: FB Culley East

Metals

Analysis Batch: 614474

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total Recoverable	Water	EPA 6020B	613656
180-174082-2	CCR-AP-5I	Total Recoverable	Water	EPA 6020B	613656
180-174082-3	DUP 1	Total Recoverable	Water	EPA 6020B	613656

Analysis Batch: 615032

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total Recoverable	Water	EPA 6010D	613656

General Chemistry

Analysis Batch: 468847

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total/NA	Water	EPA 9040C	
180-174082-2	CCR-AP-5I	Total/NA	Water	EPA 9040C	
180-174082-3	DUP 1	Total/NA	Water	EPA 9040C	
LCS 180-468847/24	Lab Control Sample	Total/NA	Water	EPA 9040C	

Analysis Batch: 468906

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total/NA	Water	SM 2540C	
180-174082-2	CCR-AP-5I	Total/NA	Water	SM 2540C	
180-174082-3	DUP 1	Total/NA	Water	SM 2540C	
MB 180-468906/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-468906/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Rad

Prep Batch: 662403

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total/NA	Water	PrecSep-21	
180-174082-2	CCR-AP-5I	Total/NA	Water	PrecSep-21	
180-174082-3	DUP 1	Total/NA	Water	PrecSep-21	
MB 160-662403/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-662403/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 662405

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-174082-1	CCR-AP-5	Total/NA	Water	PrecSep_0	
180-174082-2	CCR-AP-5I	Total/NA	Water	PrecSep_0	
180-174082-3	DUP 1	Total/NA	Water	PrecSep_0	
MB 160-662405/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-662405/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone. 412-963-7058 Fax. 412-963-2468

Chain of Custody Record

Virginia Beach Service Center

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Client Information	Sampler: Hayley Tolles	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No: 180-101847-14505 2
Client Contact: Mark Breting	Phone:	E-Mail: Andy Johnson@et.eurofinsus com	State of Origin:	Page: Page 2 of 2
Company: Atlas Technical Consultants LLC	PWSID:	Analysis Requested		Job #:
Address: 7988 Centerpoint Drive Suite 100	Due Date Requested:			Preservation Codes: N - None D - HNO3
City: Indianapolis	TAT Requested (days):			
State, Zip: IN, 46256	Compliance Project: Δ Yes Δ No			
Phone	PO #: 0129420-032-001-01			
Email: mark.breting@atcassociates.com	WO #: See Chain			Other:
Project Name: CCR GW Monitoring FB Culley East	Project #: 18016014			
Site: Culley East	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9040C, 9056A_ORGFM_28D	2540C_Calcd - TDS by 2540C	9315_Ra226, 9320_Ra228	6020B - Metals by 6020B	7470A - Hg by 7470A	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D	D	D		
CCR-AP-5	5-13-24	13:17	G	W	N		X	X	X	X	X		
CCR-AP-5E	5-13-24	14:02	G	W	N		X	X	X	X	X		
DUP 1	5-13-24		G	W	N		X	X	X	X	X		

180-174082 Chain of Custody

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Deliverable Requested I, II, III, IV, Other (specify)

Special Instructions/QC Requirements

Empty Kit Relinquished by	Date:	Time	Method of Shipment:

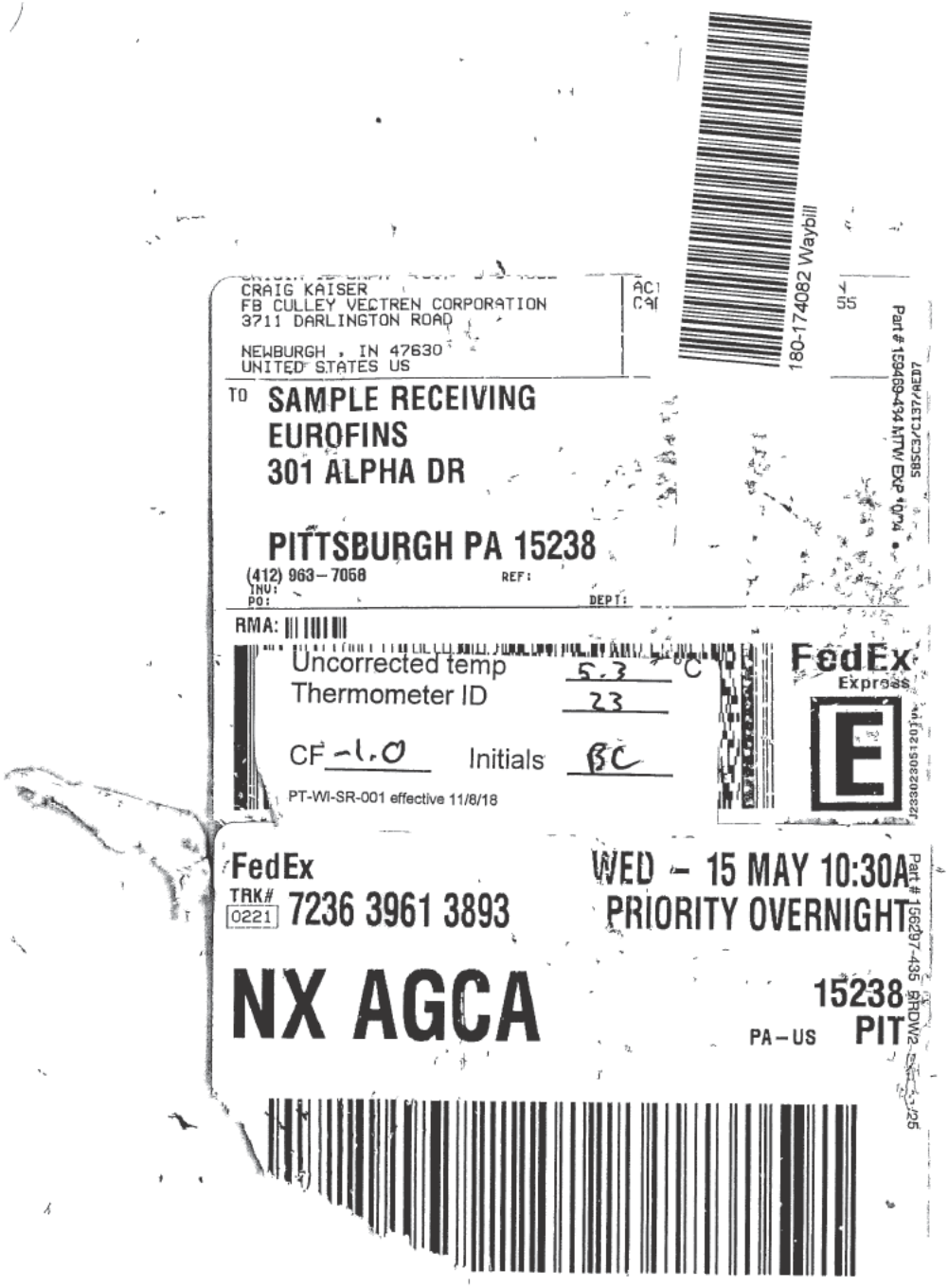
Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Hayley Tolles	5-14-24 / 1200	ATLAS	Fedex	5-14-24 / 1200	
Relinquished by	Date/Time	Company	Received by	Date/Time	Company
				05/15/24 0935	EHINE
Relinquished by	Date/Time	Company	Received by	Date/Time	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Virginia Beach Service Center

Ver: 06/08/2021

Virginia Beach Service Center



CRAIG KAISER
FB CULLEY VECTREN CORPORATION
3711 DARLINGTON ROAD

NEWBURGH , IN 47630
UNITED STATES US

180-174082 Waybill

TO SAMPLE RECEIVING
EUROFINS
301 ALPHA DR

PITTSBURGH PA 15238
(412) 963-7058

INV:
PO:
REF:
DEPT:

RMA:

Uncorrected temp 5.3 °C
Thermometer ID 23
CF -1.0 Initials BC
PT-WI-SR-001 effective 11/8/18

FedEx Express

FedEx
TRK# 0221 7236 3961 3893

WED - 15 MAY 10:30A
PRIORITY OVERNIGHT

NX AGCA

15238
PA-US PIT

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No: 180-514836.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin: Indiana	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-174082-1
Address: 13715 Rider Trail North,	Due Date Requested: 5/25/2024			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: CCR Groundwater Monitoring FB Culley East	Project #: 18016014			
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9315_Ra226/PrecSep_21 Radium-226 (GFPC) by 9315 (21-day decay)	9320_Ra228/PrecSep_0 Radium-228 (GFPC) by 9320	Ra226Ra228_GFPC/ Combined Radium-226 and Radium-228	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
CCR-AP-5 (180-174082-1)	5/13/24	13:17 Eastern		Water			X	X	X	2	
CCR-AP-5I (180-174082-2)	5/13/24	14:02 Eastern		Water			X	X	X	2	
DUP 1 (180-174082-3)	5/13/24	00:01 Eastern		Water			X	X	X	2	

Preservation Codes: -

Other:

Note: Since laboratory accreditations are subject to change, Eurofins Pittsburgh places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Pittsburgh laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Pittsburgh attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Pittsburgh.

Possible Hazard Identification *Unconfirmed*	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*** ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time: 5-16-24 1700	Company: ETPGH	Received by: Sierra Worthington	Date/Time: MAY 17 2024 0850	Company: ETPGH
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

6/19/2024

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-174082-1
SDG Number: FB Culley East

Login Number: 174082
List Number: 1
Creator: Abernathy, Eric L

List Source: Eurofins Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-174082-1
SDG Number: FB Culley East

Login Number: 174082
List Number: 3
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 05/17/24 02:07 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

PREPARED FOR

Attn: Todd Plating
Haley & Aldrich, Inc.
400 Augusta Street
Suite 100
Greenville, South Carolina 29601

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JOB DESCRIPTION

CCR Groundwater Monitoring FB Culley East
FB Culley East

JOB NUMBER

180-173881-1

Eurofins Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh PA 15238

See page two for job notes and contact information.

my EOL

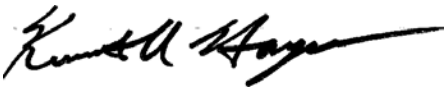
Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

PA Lab ID: 02-00416

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Pittsburgh Project Manager.

Authorization



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6/17/2024 4:43:33 PM

Authorized for release by
Ken Hayes, Project Manager II
Ken.Hayes@et.eurofinsus.com
Designee for
Andy Johnson, Senior Project Manager
Andy.Johnson@et.eurofinsus.com
(615)818-9567

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Job ID: 180-173881-1 Eurofins Pittsburgh

Job Narrative
180-173881-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 5/11/2024 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 2.1°C and 2.6°C.

Gas Flow Proportional Counter
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Job ID: 180-173881-2 Eurofins Pittsburgh

180-173881-2

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 5/11/2024 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 2.1°C and 2.6°C.

HPLC/IC
Method 9056A_ORGFM_28D: The following sample was diluted due to the nature of the sample matrix: CCR-AP-11 (180-173881-3). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Definitions/Glossary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
HF	Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Laboratory: Eurofins Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-24
California	State	2891	04-30-24 *
Connecticut	State	PH-0688	09-30-24
Florida	NELAP	E871008	06-30-24
Georgia	State	PA 02-00416	04-30-25
Illinois	NELAP	004375	07-31-25
Kansas	NELAP	E-10350	01-31-25
Kentucky (UST)	State	162013	04-30-23 *
Kentucky (WW)	State	KY98043	12-31-24
Louisiana	NELAP	04041	06-30-22 *
Louisiana (All)	NELAP	04041	06-30-24
Maine	State	PA00164	03-06-26
Minnesota	NELAP	042-999-482	12-31-24
New Hampshire	NELAP	2030	04-04-24 *
New Jersey	NELAP	PA005	06-30-24
New York	NELAP	11182	04-01-25
North Carolina (WW/SW)	State	434	12-31-24
North Dakota	State	R-227	04-30-24 *
Oregon	NELAP	PA-2151	02-06-25
Pennsylvania	NELAP	02-00416	04-30-25
Rhode Island	State	LAO00362	01-01-25
South Carolina	State	89014	04-30-25
Texas	NELAP	T104704528	03-31-25
US Fish & Wildlife	US Federal Programs	058448	03-31-24 *
USDA	US Federal Programs	P330-16-00211	04-11-26
Utah	NELAP	PA001462019-8	05-31-24
Virginia	NELAP	10043	07-14-24
West Virginia DEP	State	142	01-31-25
Wisconsin	State	998027800	08-31-24

Laboratory: Eurofins Cleveland

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-28-25
Georgia	State	4062	02-27-25
Illinois	NELAP	200004	07-31-24
Iowa	State	421	06-01-25
Kentucky (UST)	State	112225	02-27-25
Kentucky (WW)	State	KY98016	12-30-24
Minnesota	NELAP	039-999-348	12-31-24
New Jersey	NELAP	OH001	06-30-24
New York	NELAP	10975	04-02-25
Ohio VAP	State	ORELAP 4062	02-27-25
Oregon	NELAP	4062	02-27-25
Pennsylvania	NELAP	68-00340	08-31-24
Texas	NELAP	T104704517-22-19	08-31-24
USDA	US Federal Programs	P330-18-00281	01-05-27
Virginia	NELAP	460175	09-14-24
West Virginia DEP	State	210	12-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Job ID: 180-173881-1
Project/Site: CCR Groundwater Monitoring FB Culley East
SDG: FB Culley East

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-08-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-24
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-24
Connecticut	State	PH-0241	03-31-25
Florida	NELAP	E87689	06-30-24
HI - RadChem Recognition	State	n/a	06-30-24
Illinois	NELAP	200023	11-30-24
Iowa	State	373	12-01-24
Kansas	NELAP	E-10236	10-31-24
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
Louisiana	NELAP	04080	06-30-22 *
Louisiana (All)	NELAP	04080	06-30-24
Louisiana (DW)	State	LA011	12-31-24
Maryland	State	310	09-30-24
Massachusetts	State	M-MO054	06-30-24
MI - RadChem Recognition	State	9005	06-30-24
Missouri	State	780	06-30-25
Nevada	State	MO00054	07-31-24
New Jersey	NELAP	MO002	06-30-24
New Mexico	State	MO00054	06-30-24
New York	NELAP	11616	03-31-25
North Carolina (DW)	State	29700	07-31-24
North Dakota	State	R-207	06-30-24
Oklahoma	NELAP	9997	08-31-24
Oregon	NELAP	4157	09-01-24
Pennsylvania	NELAP	68-00540	02-28-25
South Carolina	State	85002001	06-30-24
Texas	NELAP	T104704193	07-31-24
US Fish & Wildlife	US Federal Programs	058448	07-31-24
USDA	US Federal Programs	P330-17-00028	05-18-26
Utah	NELAP	MO00054	07-31-24
Virginia	NELAP	460230	06-14-24
Washington	State	C592	08-30-24
West Virginia DEP	State	381	10-31-24

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
180-173881-1	CCR-AP-7	Water	05/10/24 12:00	05/11/24 10:00
180-173881-2	CCR-AP-8	Water	05/10/24 15:30	05/11/24 10:00
180-173881-3	CCR-AP-11	Water	05/10/24 14:45	05/11/24 10:00
180-173881-4	FIELD BLANK 1	Water	05/10/24 15:45	05/11/24 10:00

Method Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Method	Method Description	Protocol	Laboratory
9315	Radium-226 (GFPC)	SW846	EET SL
9320	Radium-228 (GFPC)	SW846	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Client Sample ID: CCR-AP-7

Date Collected: 05/10/24 12:00
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468668	05/15/24 16:14	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 03:09	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 12:53	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	469056	05/18/24 10:45	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 12:41	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 18:05	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468762	05/15/24 17:28	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			1006.02 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1	1.0 mL	1.0 mL	665614	06/10/24 19:21	SCB	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Prep	PrecSep_0			1006.02 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665181	06/07/24 11:40	SCB	EET SL
	Instrument ID: GFPCORANGE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-8

Date Collected: 05/10/24 15:30
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468668	05/15/24 20:40	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 05:00	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 13:56	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	469056	05/18/24 10:45	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 12:45	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 18:44	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468762	05/15/24 17:28	LWM	EET PIT
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Client Sample ID: CCR-AP-8

Date Collected: 05/10/24 15:30
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			751.75 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665614	06/10/24 19:22	SCB	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Prep	PrecSep_0			751.75 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665181	06/07/24 11:40	SCB	EET SL
	Instrument ID: GFPCORANGE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-11

Date Collected: 05/10/24 14:45
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468668	05/15/24 20:11	AM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		5	1 mL	1 mL	468668	05/15/24 20:25	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 05:04	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 14:04	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	469056	05/18/24 10:45	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 12:46	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 18:39	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468762	05/15/24 17:28	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			999.68 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665614	06/10/24 19:22	SCB	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Prep	PrecSep_0			999.68 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665181	06/07/24 11:41	SCB	EET SL
	Instrument ID: GFPCORANGE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Client Sample ID: FIELD BLANK 1

Date Collected: 05/10/24 15:45
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	468668	05/15/24 21:39	AM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			613436	05/17/24 05:09	KLC	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	613145	05/15/24 14:00	GK	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			613785	05/20/24 14:07	RKT	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			25 mL	25 mL	469056	05/18/24 10:45	SJM	EET PIT
Total/NA	Analysis	EPA 7470A		1			469200	05/20/24 12:47	MTW	EET PIT
	Instrument ID: HGY									
Total/NA	Analysis	EPA 9040C		1			468497	05/13/24 18:26	SNR	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	468762	05/15/24 17:28	LWM	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			1002.29 mL	1.0 g	661791	05/15/24 09:14	MLT	EET SL
Total/NA	Analysis	9315		1			665614	06/10/24 19:22	SCB	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Prep	PrecSep_0			1002.29 mL	1.0 g	661792	05/15/24 09:17	MLT	EET SL
Total/NA	Analysis	9320		1			665181	06/07/24 11:41	SCB	EET SL
	Instrument ID: GFPCORANGE									
Total/NA	Analysis	Ra226_Ra228		1			665833	06/12/24 08:25	FLC	EET SL
	Instrument ID: NOEQUIP									

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Analyst References:

Lab: EET CLE
- Batch Type: Prep
  - GK = Grace Kessler
- Batch Type: Analysis
  - KLC = Karen Counts
  - RKT = Roger Toth

Lab: EET PIT
- Batch Type: Prep
  - SJM = Shannon Mueller
- Batch Type: Analysis
  - AM = Adzuira Musule
  - LWM = Leslie McIntire
  - MTW = Michael Wesoloski
  - SNR = Sabra Richart

Lab: EET SL
- Batch Type: Prep
  - MLT = Michaela Tiemeyer
- Batch Type: Analysis
  - FLC = Fernando Cruz
  - SCB = Sarah Bernsen

Client Sample ID: CCR-AP-7
Lab Sample ID: 180-173881-1

Date Collected: 05/10/24 12:00
Matrix: Water
Date Received: 05/11/24 10:00

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**43**		1.0	0.71	mg/L			05/15/24 16:14	1
Fluoride	**0.31**		0.10	0.026	mg/L			05/15/24 16:14	1
Sulfate	**110**		1.0	0.76	mg/L			05/15/24 16:14	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 03:09	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 12:53	1
Arsenic	**0.00090**	**J**	0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 12:53	1
Barium	**0.10**		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 12:53	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 12:53	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 12:53	1
Calcium	**120**		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 12:53	1
Chromium	ND		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 12:53	1
Cobalt	**0.00030**	**J**	0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 12:53	1
Lead	ND		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 12:53	1
Lithium	**0.011**		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 12:53	1
Molybdenum	**0.0013**	**J**	0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 12:53	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 12:53	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 12:53	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 12:41	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**630**		10	10	mg/L			05/15/24 17:28	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.2**	**HF**	0.1	0.1	SU			05/13/24 18:05	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.337**		0.145	0.148	1.00	0.158	pCi/L	05/15/24 09:14	06/10/24 19:21	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.3*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:21*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.529	U	0.364	0.367	1.00	0.542	pCi/L	05/15/24 09:17	06/07/24 11:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.3*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:40*	*1*

Client Sample ID: CCR-AP-7
Lab Sample ID: 180-173881-1

Date Collected: 05/10/24 12:00
Matrix: Water
Date Received: 05/11/24 10:00

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*80.0*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:40*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.866**		0.392	0.396	5.00	0.542	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-8

Date Collected: 05/10/24 15:30
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-2

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	25		1.0	0.71	mg/L			05/15/24 20:40	1
Fluoride	0.22		0.10	0.026	mg/L			05/15/24 20:40	1
Sulfate	2.7		1.0	0.76	mg/L			05/15/24 20:40	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.13		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 05:00	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.00064	J	0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 13:56	1
Arsenic	0.013		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 13:56	1
Barium	0.27		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 13:56	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 13:56	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:56	1
Calcium	140		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 13:56	1
Chromium	0.0039	J	0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 13:56	1
Cobalt	0.0044		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 13:56	1
Lead	0.0030		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 13:56	1
Lithium	0.0039	J	0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 13:56	1
Molybdenum	0.012		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 13:56	1
Selenium	0.0021	J	0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 13:56	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 13:56	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 12:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	770		10	10	mg/L			05/15/24 17:28	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	7.1	HF	0.1	0.1	SU			05/13/24 18:44	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.489		0.205	0.210	1.00	0.223	pCi/L	05/15/24 09:14	06/10/24 19:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.8*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:22*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.589	U	0.505	0.508	1.00	0.791	pCi/L	05/15/24 09:17	06/07/24 11:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.8*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:40*	*1*

Client Sample ID: CCR-AP-8
Date Collected: 05/10/24 15:30
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-2
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*77.4*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:40*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.08**		0.545	0.550	5.00	0.791	pCi/L		06/12/24 08:25	1

Client Sample ID: CCR-AP-11
Date Collected: 05/10/24 14:45
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-3
Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**26**		1.0	0.71	mg/L			05/15/24 20:11	1
Fluoride	**0.30**		0.10	0.026	mg/L			05/15/24 20:11	1
Sulfate	**450**		5.0	3.8	mg/L			05/15/24 20:25	5

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**0.30**		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 05:04	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 14:04	1
Arsenic	**0.0056**		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 14:04	1
Barium	**0.15**		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 14:04	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 14:04	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 14:04	1
Calcium	**120**		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 14:04	1
Chromium	**0.0016**	**J**	0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 14:04	1
Cobalt	**0.036**		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 14:04	1
Lead	**0.00059**	**J**	0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 14:04	1
Lithium	**0.0048**	**J**	0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 14:04	1
Molybdenum	ND		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 14:04	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 14:04	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 14:04	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 12:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**900**		10	10	mg/L			05/15/24 17:28	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**6.5**	**HF**	0.1	0.1	SU			05/13/24 18:39	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.292**		0.146	0.148	1.00	0.184	pCi/L	05/15/24 09:14	06/10/24 19:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:22*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.562**		0.344	0.348	1.00	0.494	pCi/L	05/15/24 09:17	06/07/24 11:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:41*	*1*

Client Sample ID: CCR-AP-11
Date Collected: 05/10/24 14:45
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-3
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*80.0*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:41*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.854**		0.374	0.378	5.00	0.494	pCi/L		06/12/24 08:25	1

Client Sample ID: FIELD BLANK 1

Date Collected: 05/10/24 15:45
Date Received: 05/11/24 10:00

Lab Sample ID: 180-173881-4

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.71	mg/L			05/15/24 21:39	1
Fluoride	ND		0.10	0.026	mg/L			05/15/24 21:39	1
Sulfate	ND		1.0	0.76	mg/L			05/15/24 21:39	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 05:09	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 14:07	1
Arsenic	ND		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 14:07	1
Barium	ND		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 14:07	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 14:07	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 14:07	1
Calcium	ND		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 14:07	1
Chromium	ND		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 14:07	1
Cobalt	ND		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 14:07	1
Lead	ND		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 14:07	1
Lithium	ND		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 14:07	1
Molybdenum	ND		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 14:07	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 14:07	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 14:07	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 12:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	ND		10	10	mg/L			05/15/24 17:28	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**5.5**	**HF**	0.1	0.1	SU			05/13/24 18:26	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0213	U	0.0708	0.0708	1.00	0.163	pCi/L	05/15/24 09:14	06/10/24 19:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*30 - 110*	*05/15/24 09:14*	*06/10/24 19:22*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0176	U	0.303	0.303	1.00	0.579	pCi/L	05/15/24 09:17	06/07/24 11:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:41*	*1*

Client Sample ID: FIELD BLANK 1
Lab Sample ID: 180-173881-4

Date Collected: 05/10/24 15:45
Matrix: Water
Date Received: 05/11/24 10:00

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*80.0*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:41*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.0389	U	0.311	0.311	5.00	0.579	pCi/L		06/12/24 08:25	1

Method: EPA 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 180-468668/6
Matrix: Water
Analysis Batch: 468668

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.71	mg/L			05/15/24 10:48	1
Fluoride	ND		0.10	0.026	mg/L			05/15/24 10:48	1
Sulfate	ND		1.0	0.76	mg/L			05/15/24 10:48	1

Lab Sample ID: LCS 180-468668/7
Matrix: Water
Analysis Batch: 468668

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	50.2		mg/L		100	80 - 120
Fluoride	2.50	2.49		mg/L		99	80 - 120
Sulfate	50.0	49.9		mg/L		100	80 - 120

Lab Sample ID: 180-173881-1 MS
Matrix: Water
Analysis Batch: 468668

Client Sample ID: CCR-AP-7
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	43		250	286		mg/L		97	80 - 120
Fluoride	0.31		12.5	12.2		mg/L		95	80 - 120
Sulfate	110		250	347		mg/L		96	80 - 120

Lab Sample ID: 180-173881-1 MSD
Matrix: Water
Analysis Batch: 468668

Client Sample ID: CCR-AP-7
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	43		250	294		mg/L		101	80 - 120	3	15
Fluoride	0.31		12.5	12.6		mg/L		98	80 - 120	3	15
Sulfate	110		250	360		mg/L		101	80 - 120	4	15

Method: EPA 6010D - Metals (ICP)

Lab Sample ID: MB 240-613145/1-A
Matrix: Water
Analysis Batch: 613436

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.10	0.057	mg/L		05/15/24 14:00	05/17/24 03:00	1

Lab Sample ID: LCS 240-613145/2-A
Matrix: Water
Analysis Batch: 613436

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1.00	1.04		mg/L		104	80 - 120

Method: EPA 6010D - Metals (ICP) (Continued)

Lab Sample ID: 180-173881-1 MS
Matrix: Water
Analysis Batch: 613436

Client Sample ID: CCR-AP-7
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	ND		1.00	1.05		mg/L		105	75 - 125

Lab Sample ID: 180-173881-1 MSD
Matrix: Water
Analysis Batch: 613436

Client Sample ID: CCR-AP-7
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Boron	ND		1.00	1.10		mg/L		110	75 - 125	4	20

Method: EPA 6020B - Metals (ICP/MS)

Lab Sample ID: MB 240-613145/1-A
Matrix: Water
Analysis Batch: 613785

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		05/15/24 14:00	05/20/24 12:45	1
Arsenic	ND		0.0050	0.00075	mg/L		05/15/24 14:00	05/20/24 12:45	1
Barium	ND		0.0050	0.0022	mg/L		05/15/24 14:00	05/20/24 12:45	1
Beryllium	ND		0.0010	0.00062	mg/L		05/15/24 14:00	05/20/24 12:45	1
Cadmium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 12:45	1
Calcium	ND		1.0	0.25	mg/L		05/15/24 14:00	05/20/24 12:45	1
Chromium	ND		0.0050	0.0012	mg/L		05/15/24 14:00	05/20/24 12:45	1
Cobalt	ND		0.0010	0.00019	mg/L		05/15/24 14:00	05/20/24 12:45	1
Lead	ND		0.0010	0.00045	mg/L		05/15/24 14:00	05/20/24 12:45	1
Lithium	ND		0.0080	0.0017	mg/L		05/15/24 14:00	05/20/24 12:45	1
Molybdenum	ND		0.0050	0.0011	mg/L		05/15/24 14:00	05/20/24 12:45	1
Selenium	ND		0.0050	0.00089	mg/L		05/15/24 14:00	05/20/24 12:45	1
Thallium	ND		0.0010	0.00020	mg/L		05/15/24 14:00	05/20/24 12:45	1

Lab Sample ID: LCS 240-613145/3-A
Matrix: Water
Analysis Batch: 613785

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.100	0.0942		mg/L		94	80 - 120
Arsenic	1.00	0.944		mg/L		94	80 - 120
Barium	1.00	0.933		mg/L		93	80 - 120
Beryllium	0.500	0.468		mg/L		94	80 - 120
Cadmium	0.500	0.479		mg/L		96	80 - 120
Calcium	25.0	24.5		mg/L		98	80 - 120
Chromium	0.500	0.481		mg/L		96	80 - 120
Cobalt	0.500	0.482		mg/L		96	80 - 120
Lead	0.500	0.488		mg/L		98	80 - 120
Lithium	0.500	0.518		mg/L		104	80 - 120
Molybdenum	0.500	0.469		mg/L		94	80 - 120
Selenium	1.00	0.951		mg/L		95	80 - 120
Thallium	1.00	0.970		mg/L		97	80 - 120

Method: EPA 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: 180-173881-1 MS
Matrix: Water
Analysis Batch: 613785

Client Sample ID: CCR-AP-7
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	ND		0.100	0.0971		mg/L		97	80 - 120
Arsenic	0.00090	J	1.00	0.977		mg/L		98	80 - 120
Barium	0.10		1.00	1.06		mg/L		96	80 - 120
Beryllium	ND		0.500	0.473		mg/L		95	80 - 120
Cadmium	ND		0.500	0.488		mg/L		98	80 - 120
Calcium	120		25.0	148	4	mg/L		105	80 - 120
Chromium	ND		0.500	0.494		mg/L		99	80 - 120
Cobalt	0.00030	J	0.500	0.495		mg/L		99	80 - 120
Lead	ND		0.500	0.488		mg/L		98	80 - 120
Lithium	0.011		0.500	0.540		mg/L		106	80 - 120
Molybdenum	0.0013	J	0.500	0.488		mg/L		97	80 - 120
Selenium	ND		1.00	0.960		mg/L		96	80 - 120
Thallium	ND		1.00	0.979		mg/L		98	80 - 120

Lab Sample ID: 180-173881-1 MSD
Matrix: Water
Analysis Batch: 613785

Client Sample ID: CCR-AP-7
Prep Type: Total Recoverable
Prep Batch: 613145

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Antimony	ND		0.100	0.0966		mg/L		97	80 - 120	0	20
Arsenic	0.00090	J	1.00	0.970		mg/L		97	80 - 120	1	20
Barium	0.10		1.00	1.05		mg/L		95	80 - 120	1	20
Beryllium	ND		0.500	0.468		mg/L		94	80 - 120	1	20
Cadmium	ND		0.500	0.487		mg/L		97	80 - 120	0	20
Calcium	120		25.0	148	4	mg/L		105	80 - 120	0	20
Chromium	ND		0.500	0.494		mg/L		99	80 - 120	0	20
Cobalt	0.00030	J	0.500	0.493		mg/L		99	80 - 120	0	20
Lead	ND		0.500	0.499		mg/L		100	80 - 120	2	20
Lithium	0.011		0.500	0.543		mg/L		106	80 - 120	0	20
Molybdenum	0.0013	J	0.500	0.489		mg/L		98	80 - 120	0	20
Selenium	ND		1.00	0.958		mg/L		96	80 - 120	0	20
Thallium	ND		1.00	0.996		mg/L		100	80 - 120	2	20

Method: EPA 7470A - Mercury (CVAA)

Lab Sample ID: MB 180-469056/1-A
Matrix: Water
Analysis Batch: 469200

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 469056

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		05/18/24 10:45	05/20/24 12:39	1

Lab Sample ID: LCS 180-469056/2-A
Matrix: Water
Analysis Batch: 469200

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 469056

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	0.00250	0.00249		mg/L		100	80 - 120

Method: EPA 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: 180-173881-1 MS
Matrix: Water
Analysis Batch: 469200

Client Sample ID: CCR-AP-7
Prep Type: Total/NA
Prep Batch: 469056

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	ND		0.00100	0.000930		mg/L		93	75 - 125

Lab Sample ID: 180-173881-1 MSD
Matrix: Water
Analysis Batch: 469200

Client Sample ID: CCR-AP-7
Prep Type: Total/NA
Prep Batch: 469056

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	ND		0.00100	0.000943		mg/L		94	75 - 125	1	20

Method: EPA 9040C - pH

Lab Sample ID: LCS 180-468497/24
Matrix: Water
Analysis Batch: 468497

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
pH	7.00	7.0		SU		100	99 - 101

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 180-468762/1
Matrix: Water
Analysis Batch: 468762

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			05/15/24 17:28	1

Lab Sample ID: LCS 180-468762/2
Matrix: Water
Analysis Batch: 468762

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	417	418		mg/L		100	85 - 115

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-661791/1-A
Matrix: Water
Analysis Batch: 665297

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 661791

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.01654	U	0.0608	0.0608	1.00	0.121	pCi/L	05/15/24 09:14	06/10/24 16:32	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.0*		*30 - 110*	*05/15/24 09:14*	*06/10/24 16:32*	*1*

Method: 9315 - Radium-226 (GFPC) (Continued)

Lab Sample ID: LCS 160-661791/2-A
Matrix: Water
Analysis Batch: 665297

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 661791

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	10.47		1.18	1.00	0.156	pCi/L	92	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*78.9*		*30 - 110*

Lab Sample ID: 180-173881-1 DU
Matrix: Water
Analysis Batch: 665614

Client Sample ID: CCR-AP-7
Prep Type: Total/NA
Prep Batch: 661791

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	0.337			0.1424	U	0.122	1.00	0.183	pCi/L			0.72	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*84.6*		*30 - 110*

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-661792/1-A
Matrix: Water
Analysis Batch: 665182

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 661792

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.5941		0.362	0.367	1.00	0.526	pCi/L	05/15/24 09:17	06/07/24 11:51	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.0*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:51*	*1*
Y Carrier	*77.4*		*30 - 110*	*05/15/24 09:17*	*06/07/24 11:51*	*1*

Lab Sample ID: LCS 160-661792/2-A
Matrix: Water
Analysis Batch: 665182

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 661792

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.87	10.19		1.45	1.00	0.679	pCi/L	115	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*78.9*		*30 - 110*
Y Carrier	*78.5*		*30 - 110*

Method: 9320 - Radium-228 (GFPC) (Continued)

Lab Sample ID: 180-173881-1 DU
Matrix: Water
Analysis Batch: 665181

Client Sample ID: CCR-AP-7
Prep Type: Total/NA
Prep Batch: 661792

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-228	0.529	U		0.8667		0.426	1.00	0.565	pCi/L			0.43	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*84.6*		*30 - 110*
Y Carrier	*78.9*		*30 - 110*

HPLC/IC

Analysis Batch: 468668

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total/NA	Water	EPA 9056A	
180-173881-2	CCR-AP-8	Total/NA	Water	EPA 9056A	
180-173881-3	CCR-AP-11	Total/NA	Water	EPA 9056A	
180-173881-3	CCR-AP-11	Total/NA	Water	EPA 9056A	
180-173881-4	FIELD BLANK 1	Total/NA	Water	EPA 9056A	
MB 180-468668/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-468668/7	Lab Control Sample	Total/NA	Water	EPA 9056A	
180-173881-1 MS	CCR-AP-7	Total/NA	Water	EPA 9056A	
180-173881-1 MSD	CCR-AP-7	Total/NA	Water	EPA 9056A	

Metals

Prep Batch: 469056

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total/NA	Water	7470A	
180-173881-2	CCR-AP-8	Total/NA	Water	7470A	
180-173881-3	CCR-AP-11	Total/NA	Water	7470A	
180-173881-4	FIELD BLANK 1	Total/NA	Water	7470A	
MB 180-469056/1-A	Method Blank	Total/NA	Water	7470A	
LCS 180-469056/2-A	Lab Control Sample	Total/NA	Water	7470A	
180-173881-1 MS	CCR-AP-7	Total/NA	Water	7470A	
180-173881-1 MSD	CCR-AP-7	Total/NA	Water	7470A	

Analysis Batch: 469200

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total/NA	Water	EPA 7470A	469056
180-173881-2	CCR-AP-8	Total/NA	Water	EPA 7470A	469056
180-173881-3	CCR-AP-11	Total/NA	Water	EPA 7470A	469056
180-173881-4	FIELD BLANK 1	Total/NA	Water	EPA 7470A	469056
MB 180-469056/1-A	Method Blank	Total/NA	Water	EPA 7470A	469056
LCS 180-469056/2-A	Lab Control Sample	Total/NA	Water	EPA 7470A	469056
180-173881-1 MS	CCR-AP-7	Total/NA	Water	EPA 7470A	469056
180-173881-1 MSD	CCR-AP-7	Total/NA	Water	EPA 7470A	469056

Prep Batch: 613145

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total Recoverable	Water	3005A	
180-173881-2	CCR-AP-8	Total Recoverable	Water	3005A	
180-173881-3	CCR-AP-11	Total Recoverable	Water	3005A	
180-173881-4	FIELD BLANK 1	Total Recoverable	Water	3005A	
MB 240-613145/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-613145/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-613145/3-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-173881-1 MS	CCR-AP-7	Total Recoverable	Water	3005A	
180-173881-1 MS	CCR-AP-7	Total Recoverable	Water	3005A	
180-173881-1 MSD	CCR-AP-7	Total Recoverable	Water	3005A	
180-173881-1 MSD	CCR-AP-7	Total Recoverable	Water	3005A	

Analysis Batch: 613436

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total Recoverable	Water	EPA 6010D	613145

Metals (Continued)

Analysis Batch: 613436 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-2	CCR-AP-8	Total Recoverable	Water	EPA 6010D	613145
180-173881-3	CCR-AP-11	Total Recoverable	Water	EPA 6010D	613145
180-173881-4	FIELD BLANK 1	Total Recoverable	Water	EPA 6010D	613145
MB 240-613145/1-A	Method Blank	Total Recoverable	Water	EPA 6010D	613145
LCS 240-613145/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6010D	613145
180-173881-1 MS	CCR-AP-7	Total Recoverable	Water	EPA 6010D	613145
180-173881-1 MSD	CCR-AP-7	Total Recoverable	Water	EPA 6010D	613145

Analysis Batch: 613785

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total Recoverable	Water	EPA 6020B	613145
180-173881-2	CCR-AP-8	Total Recoverable	Water	EPA 6020B	613145
180-173881-3	CCR-AP-11	Total Recoverable	Water	EPA 6020B	613145
180-173881-4	FIELD BLANK 1	Total Recoverable	Water	EPA 6020B	613145
MB 240-613145/1-A	Method Blank	Total Recoverable	Water	EPA 6020B	613145
LCS 240-613145/3-A	Lab Control Sample	Total Recoverable	Water	EPA 6020B	613145
180-173881-1 MS	CCR-AP-7	Total Recoverable	Water	EPA 6020B	613145
180-173881-1 MSD	CCR-AP-7	Total Recoverable	Water	EPA 6020B	613145

General Chemistry

Analysis Batch: 468497

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total/NA	Water	EPA 9040C	
180-173881-2	CCR-AP-8	Total/NA	Water	EPA 9040C	
180-173881-3	CCR-AP-11	Total/NA	Water	EPA 9040C	
180-173881-4	FIELD BLANK 1	Total/NA	Water	EPA 9040C	
LCS 180-468497/24	Lab Control Sample	Total/NA	Water	EPA 9040C	

Analysis Batch: 468762

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total/NA	Water	SM 2540C	
180-173881-2	CCR-AP-8	Total/NA	Water	SM 2540C	
180-173881-3	CCR-AP-11	Total/NA	Water	SM 2540C	
180-173881-4	FIELD BLANK 1	Total/NA	Water	SM 2540C	
MB 180-468762/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-468762/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Rad

Prep Batch: 661791

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total/NA	Water	PrecSep-21	
180-173881-2	CCR-AP-8	Total/NA	Water	PrecSep-21	
180-173881-3	CCR-AP-11	Total/NA	Water	PrecSep-21	
180-173881-4	FIELD BLANK 1	Total/NA	Water	PrecSep-21	
MB 160-661791/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-661791/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
180-173881-1 DU	CCR-AP-7	Total/NA	Water	PrecSep-21	

QC Association Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-173881-1
SDG: FB Culley East

Rad

Prep Batch: 661792

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-173881-1	CCR-AP-7	Total/NA	Water	PrecSep_0	
180-173881-2	CCR-AP-8	Total/NA	Water	PrecSep_0	
180-173881-3	CCR-AP-11	Total/NA	Water	PrecSep_0	
180-173881-4	FIELD BLANK 1	Total/NA	Water	PrecSep_0	
MB 160-661792/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-661792/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
180-173881-1 DU	CCR-AP-7	Total/NA	Water	PrecSep_0	

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

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Client Information	Sampler: Hayley Tolles	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No.: 180-101847-14505.2
Client Contact: Mark Breting	Phone:	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin:	Page: Page 2 of 2
Company: Atlas Technical Consultants LLC	PWSID:			Job #:
Address: 7988 Centerpoint Drive Suite 100	Due Date Requested:			
City: Indianapolis	TAT Requested (days):			
State, Zip: IN, 46256	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 0129420-032-001-01			
Email: mark.breting@atcassociates.com	WO #: See Chain			
Project Name: CCR GW Monitoring FB Culley East	Project #: 18016014			
Site: Culley East	SSOW#:			

Analysis Requested

Preservation Codes:
N - None
D - HNO3

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	9040C, 9056A_ORGFM_28D	2540C_Calcd - TDS by 2540C	9315_Ra226, 9320_Ra228	6020B - Metals by 6020B	7470A - Hg by 7470A	Special Instructions/Note:
CCR-AP-7	5-10-24	12:00	G	W	X	X	X	X	X	
CCA-AP-8		15:30	G	W	X	X	X	X	X	
CCR-AP-11		14:45	G	W	X	X	X	X	X	
MS 1		12:00	G	W	X	X	X	X	X	
MSD 1		12:00	G	W	X	X	X	X	X	
Field Blank 1	5-10-24	15:45	G	W	X	X	X	X	X	

180-173881 Chain of Custody

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:				
Relinquished by: Hayley Tolles	Date/Time: 5-10-24/17:15	Company: ATLAS	Received by: Fedex	Date/Time: 5-10-24/17:15	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 05/11/24 1000	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021



ORIGIN ID:GTYA (317) 579-4082
CRAIG KAISER
FB CULLEY VECTREN CORP
3711 DARLINGTON ROAD

NEWBURGH, IN 47630
UNITED STATES US

SHIP DATE: 06MAY24
ACTWGT: 44.00 LB MAN
CAD: 0129689/CAFE3511

570C3/C137/6F4D

TO SAMPLE RECEIVING
EUROFINS ENVIRONMENT TESTING NE
301 ALPHA DRIVE
RIDC PARK
PITTSBURGH PA 152382907

(412) 963-7058 REF:
INV:
PO: DEPT:

RMA:

Uncorrected temp 2.5 °C
Thermometer ID 2G
CF -0.2 Initials PM
PT-WI-SR-001 effective 11/8/18

FedEx Express

J211020121101uv

Part # 156297-435 RRDW2 EXP 01/25

SATURDAY 12:00P
PRIORITY OVERNIGHT

15238
PIT
PA-US

FedEx
TRK# 0221 6772 2904 7044

XO AGCA

#5579144 05/10 5B3J4/C45B/9AE3

180-173881 Waybill

FedEx
TRK# 0221 6772 2904 7055

XO AGCA

SATURDAY 12:00P
PRIORITY OVERNIGHT

15238
PIT
PA-US

Part # 156297-435 RRDW2 EXP 01/25

Uncorrected temp
Thermometer ID

2.9 °C
17

CF -0.3 Initials

PT-WI-SR-001 effective 11/8/18

#5579149 05/10 5B3J4/C458/9AE3

FedEx Express

J211202121101uv

ORIGIN ID:GTYA (317) 579-4082
CRAIG KAISER
FB CULLEY VECTREN CORP
3711 DARLINGTON ROAD
NEWBURGH, IN 47630
UNITED STATES US

SHIP DATE: 06MAY24
ACTWGT: 44.00 LB MAN
CAD: 0128689/CAFE3511

TO SAMPLE RECEIVING
EUROFINS ENVIRONMENT TESTING NE
301 ALPHA DRIVE
RIDC PARK
PITTSBURGH PA 152382907
(412) 963-7058

INV:
PO:
REF:
DEPT:

RMA:

576CA/C137/6F4D

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6/17/2024

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

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Client Information (Sub Contract Lab)	Sampler:	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No: 180-514536.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin: Indiana	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-173881-1
Address: 13715 Rider Trail North,	Due Date Requested: 5/23/2024			Preservation Codes:
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: CCR Groundwater Monitoring FB Culley East	Project #: 18016014			
Site:	SSOW#:			Other:

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9315_Ra226/PrecSep_21 Radium-226 (GFPC) by 9315 (21-day decay)	9320_Ra228/PrecSep_0 Radium-228 (GFPC) by 9320	Ra226Ra228_GFPC/ Combined Radium-226 and Radium-228	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
CCR-AP-7 (180-173881-1DU)	5/10/24	12:00 Eastern	DU	Water			X	X		4	
CCR-AP-8 (180-173881-2)	5/10/24	15:30 Eastern		Water			X	X	X	1	
CCR-AP-11 (180-173881-3)	5/10/24	14:45 Eastern		Water			X	X	X	2	
FIELD BLANK 1 (180-173881-4)	5/10/24	15:45 Eastern		Water			X	X	X	2	

Note: Since laboratory accreditations are subject to change, Eurofins Pittsburgh places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Pittsburgh laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Pittsburgh attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Pittsburgh.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
	[signature]	5-13-24 1700	EPINE	[signature] M. Pinette		
	Relinquished by:	Date/Time:	Company	Received by:	MAY 14 2024 0460	Company
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

6/17/2024

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-173881-1
SDG Number: FB Culley East

Login Number: 173881
List Number: 1
Creator: Abernathy, Eric L

List Source: Eurofins Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-173881-1
SDG Number: FB Culley East

Login Number: 173881
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 05/14/24 01:52 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

PREPARED FOR

Attn: Todd Plating
Haley & Aldrich, Inc.
400 Augusta Street
Suite 100
Greenville, South Carolina 29601

Generated 12/28/2024 8:35:19 AM

JOB DESCRIPTION

CCR Groundwater Monitoring FB Culley East
FB Culley East

JOB NUMBER

180-182961-1

Eurofins Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh PA 15238

See page two for job notes and contact information.

my EOL

Eurofins Pittsburgh

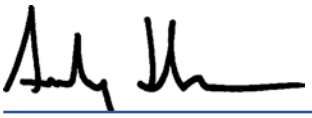
Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

PA Lab ID: 02-00416

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Pittsburgh Project Manager.

Authorization



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12/28/2024 8:35:19 AM

Authorized for release by
Andy Johnson, Senior Project Manager
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Job Narrative
180-182961-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 11/16/2024 9:30 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 6 coolers at receipt time were 1.6°C, 1.7°C, 2.3°C, 2.7°C, 3.5°C and 4.0°C.

Receipt Exceptions
Only one 1L nitric preserved bottle was received and contained about 600mL of sample volume. CCR-AP-9 (180-182961-6)

Only one 1L nitric preserved container was received and contained about 650mL of sample volume. CCR-AP-2 (180-182961-2)

Only one 1L nitric preserved bottle was received and the container was only filled with about 500mL of sample volume. CCR-AP-1R (180-182961-1)

Only one 1L nitric preserved container was received and contained about 450mL of sample volume. CCR-AP-4 (180-182961-3)

A Chain-of-Custody (COC) was not received with these samples but was provided by the client: CCR-AP-1R (180-182961-1), CCR-AP-2 (180-182961-2), CCR-AP-4 (180-182961-3), CCR-AP-5 (180-182961-4), CCR-AP-6I (180-182961-5), CCR-AP-9 (180-182961-6), CCR-AP-11 (180-182961-7), DUP-1 (180-182961-8) and FIELD BLANK 1 (180-182961-9).

Gas Flow Proportional Counter
Method 9320_Ra228: Radium-228 prep batch 160-689999: The detection goal was not met for the following samples due to the reduced sample volume attributed to the presence of matrix interferences: CCR-AP-1R (180-182961-1), CCR-AP-2 (180-182961-2) and CCR-AP-4 (180-182961-3) . Analytical results are reported with the detection limit achieved.

Method 9320_Ra228: Radium-228 batch 690431: The detection goal was not met for the following sample due to the reduced sample volume attributed to the presence of matrix interferences: CCR-AP-9 (180-182961-6). Analytical results are reported with the detection limit achieved.

Method 9320_Ra228: Radium-228 Prep Batch 160-689999: The sample duplicate (DU) associated with the following samples has a replicate error ratio (RER: 1.1) outside of the upper control limit (1.0): CCR-AP-1R (180-182961-1), CCR-AP-2 (180-182961-2) and CCR-AP-4 (180-182961-3). There is insufficient sample volume to re-prep/re-analyze the samples, so the data have been reported with this narrative.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Job ID: 180-182961-2 Eurofins Pittsburgh

Job Narrative
180-182961-2

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 11/16/2024 9:30 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 6 coolers at receipt time were 1.6°C, 1.7°C, 2.3°C, 2.7°C, 3.5°C and 4.0°C.

Receipt Exceptions
Only one 1L nitric preserved bottle was received and contained about 600mL of sample volume. CCR-AP-9 (180-182961-6)

Only one 1L nitric preserved container was received and contained about 650mL of sample volume. CCR-AP-2 (180-182961-2)

Only one 1L nitric preserved bottle was received and the container was only filled with about 500mL of sample volume. CCR-AP-1R (180-182961-1)

Only one 1L nitric preserved container was received and contained about 450mL of sample volume. CCR-AP-4 (180-182961-3)

A Chain-of-Custody (COC) was not received with these samples: CCR-AP-1R (180-182961-1), CCR-AP-2 (180-182961-2), CCR-AP-4 (180-182961-3), CCR-AP-5 (180-182961-4), CCR-AP-6I (180-182961-5), CCR-AP-9 (180-182961-6), CCR-AP-11 (180-182961-7), DUP-1 (180-182961-8) and FIELD BLANK 1 (180-182961-9) but was provided by the client.

HPLC/IC
Method 9056A_ORGFM_28D: The following samples were diluted to bring the concentration of target analytes within the calibration range: CCR-AP-2 (180-182961-2), CCR-AP-5 (180-182961-4), CCR-AP-9 (180-182961-6), CCR-AP-11 (180-182961-7), DUP-1 (180-182961-8), (180-182934-D-5), (180-182934-D-5 MS) and (180-182934-D-5 MSD). Elevated reporting limits (RLs) are provided.

Method 9056A_ORGFM_28D: The following samples was diluted due to the nature of the sample matrix: CCR-AP-9 (180-182961-6). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals
Method 6020B - Total Recoverable: The laboratory control sample (LCS) for preparation batch 240-636038 and analytical batch 240-636305 recovered outside control limits for the following analytes: Thallium. These analytes were biased high in the LCS and were below the reporting limit in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
Method 2540C_Calcd: Due to matrix and/or conductivity, initial amount of sample used was reduced. CCR-AP-1R (180-182961-1), CCR-AP-4 (180-182961-3) and CCR-AP-9 (180-182961-6)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Definitions/Glossary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-182961-1
SDG: FB Culley East

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
HF	Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.

Rad

Qualifier	Qualifier Description
G	The Sample MDC is greater than the requested RL.
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-182961-1
SDG: FB Culley East

Laboratory: Eurofins Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-28-25
California	State	2891	04-30-24 *
Connecticut	State	PH-0688	09-30-24 *
Florida	NELAP	E871008	06-30-25
Georgia	State	PA 02-00416	04-30-25
Illinois	NELAP	004375	07-31-25
Kansas	NELAP	E-10350	01-31-25
Kentucky (UST)	State	162013	04-30-25
Kentucky (WW)	State	KY98043	12-31-24
Louisiana	NELAP	04041	06-30-22 *
Louisiana (All)	NELAP	04041	06-30-25
Maine	State	PA00164	03-06-26
Minnesota	NELAP	042-999-482	12-31-24
New Hampshire	NELAP	2030	04-04-25
New Jersey	NELAP	PA005	06-30-25
New York	NELAP	11182	04-01-25
North Carolina (WW/SW)	State	434	12-31-24
North Dakota	State	R-227	04-30-24 *
Oregon	NELAP	PA-2151	02-06-25
Pennsylvania	NELAP	02-00416	12-05-24
Rhode Island	State	LAO00362	01-01-25
South Carolina	State	89014	11-24-24
Texas	NELAP	T104704528	03-31-25
US Fish & Wildlife	US Federal Programs	058448	04-30-25
USDA	US Federal Programs	P330-16-00211	04-11-26
Utah	NELAP	PA001462024-14	05-31-25
Virginia	NELAP	10043	07-14-24 *
West Virginia DEP	State	142	01-31-25
Wisconsin	State	998027800	08-31-25

Laboratory: Eurofins Cleveland

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-28-25
Connecticut	State	PH-0806	12-31-26
Georgia	State	4062	02-27-25
Illinois	NELAP	200004	08-31-25
Iowa	State	421	06-01-25
Kentucky (UST)	State	112225	02-27-25
Kentucky (WW)	State	KY98016	12-30-24
Minnesota	NELAP	039-999-348	12-31-25
New Hampshire	NELAP	225024	09-30-25
New Jersey	NELAP	OH001	07-03-25
New York	NELAP	10975	04-02-25
Ohio VAP	State	ORELAP 4062	02-27-25
Oregon	NELAP	4062	02-27-25
Pennsylvania	NELAP	68-00340	08-31-25
Texas	NELAP	T104704517-22-19	08-31-25
USDA	US Federal Programs	P330-18-00281	01-05-27

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.
Job ID: 180-182961-1
Project/Site: CCR Groundwater Monitoring FB Culley East
SDG: FB Culley East

Laboratory: Eurofins Cleveland (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Virginia	NELAP	460175	09-14-25
West Virginia DEP	State	210	12-31-24

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-08-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-25
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-25
Connecticut	State	PH-0241	03-31-25
Florida	NELAP	E87689	06-30-25
HI - RadChem Recognition	State	n/a	06-30-25
Illinois	NELAP	200023	11-30-25
Iowa	State	373	12-01-26
Kansas	NELAP	E-10236	10-31-25
Kentucky (DW)	State	KY90125	12-31-24
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-24
Louisiana	NELAP	04080	06-30-22 *
Louisiana (All)	NELAP	04080	06-30-25
Louisiana (DW)	State	LA011	12-31-24
Maryland	State	310	09-30-25
Massachusetts	State	M-MO054	06-30-25
MI - RadChem Recognition	State	9005	06-30-25
Missouri	State	780	06-30-25
Nevada	State	MO00054	07-31-25
New Jersey	NELAP	MO002	06-30-25
New Mexico	State	MO00054	06-30-25
New York	NELAP	11616	03-31-25
North Carolina (DW)	State	29700	07-31-25
North Dakota	State	R-207	12-31-24
Oklahoma	NELAP	9997	12-31-24
Oregon	NELAP	4157	09-01-25
Pennsylvania	NELAP	68-00540	02-28-25
South Carolina	State	85002001	06-30-25
Texas	NELAP	T104704193	07-31-25
US Fish & Wildlife	US Federal Programs	058448	07-31-25
USDA	US Federal Programs	P330-17-00028	05-18-26
Utah	NELAP	MO00054	07-31-25
Virginia	NELAP	460230	06-14-25
Washington	State	C592	08-30-25
West Virginia DEP	State	381	10-31-25

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-182961-1
SDG: FB Culley East

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
180-182961-1	CCR-AP-1R	Water	11/14/24 06:45	11/16/24 09:30
180-182961-2	CCR-AP-2	Water	11/14/24 08:05	11/16/24 09:30
180-182961-3	CCR-AP-4	Water	11/14/24 13:20	11/16/24 09:30
180-182961-4	CCR-AP-5	Water	11/14/24 15:45	11/16/24 09:30
180-182961-5	CCR-AP-6I	Water	11/13/24 08:41	11/16/24 09:30
180-182961-6	CCR-AP-9	Water	11/14/24 10:50	11/16/24 09:30
180-182961-7	CCR-AP-11	Water	11/15/24 08:58	11/16/24 09:30
180-182961-8	DUP-1	Water	11/14/24 00:00	11/16/24 09:30
180-182961-9	FIELD BLANK 1	Water	11/15/24 11:55	11/16/24 09:30

Method Summary

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-182961-1
SDG: FB Culley East

Method	Method Description	Protocol	Laboratory
9315	Radium-226 (GFPC)	SW846	EET SL
9320	Radium-228 (GFPC)	SW846	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-182961-1
SDG: FB Culley East

Client Sample ID: CCR-AP-1R

Date Collected: 11/14/24 06:45
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	484985	11/21/24 15:21	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			636493	11/22/24 21:35	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 19:52	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:08	TQ6W	EET CLE
	Instrument ID: H11									
Total/NA	Analysis	EPA 9040C		1			485167	11/23/24 09:44	BAB	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	484667	11/18/24 11:43	EBA	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			507.78 mL	1.0 g	689970	11/22/24 09:22	BCE	EET SL
Total/NA	Analysis	9315		1			693993	12/16/24 20:57	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Prep	PrecSep_0			507.78 mL	1.0 g	689999	11/22/24 12:14	BCE	EET SL
Total/NA	Analysis	9320		1	1.0 mL	1.0 mL	693093	12/11/24 12:45	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 09:30	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-2

Date Collected: 11/14/24 08:05
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	484985	11/21/24 15:51	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		10	1 mL	1 mL	484985	11/21/24 16:06	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			636493	11/22/24 21:39	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 19:55	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:10	TQ6W	EET CLE
	Instrument ID: H11									
Total/NA	Analysis	EPA 9040C		1			485167	11/23/24 09:44	BAB	EET PIT
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-182961-1
SDG: FB Culley East

Client Sample ID: CCR-AP-2

Date Collected: 11/14/24 08:05
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	484659	11/18/24 11:34	EBA	EET PIT
Total/NA	Prep	PrecSep-21			507.75 mL	1.0 g	689970	11/22/24 09:22	BCE	EET SL
Total/NA	Analysis	9315		1			693993	12/16/24 20:57	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Prep	PrecSep_0			507.75 mL	1.0 g	689999	11/22/24 12:14	BCE	EET SL
Total/NA	Analysis	9320		1			693093	12/11/24 12:45	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 09:30	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-4

Date Collected: 11/14/24 13:20
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	484985	11/21/24 16:23	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			636493	11/22/24 21:43	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 20:03	AJC	EET CLE
	Instrument ID: I14									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636748	11/26/24 02:46	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:11	TQ6W	EET CLE
	Instrument ID: H11									
Total/NA	Analysis	EPA 9040C		1			485167	11/23/24 09:44	BAB	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	484667	11/18/24 11:43	EBA	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			479.14 mL	1.0 g	689970	11/22/24 09:22	BCE	EET SL
Total/NA	Analysis	9315		1			693993	12/16/24 20:58	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Prep	PrecSep_0			479.14 mL	1.0 g	689999	11/22/24 12:14	BCE	EET SL
Total/NA	Analysis	9320		1	1.0 mL	1.0 mL	693093	12/11/24 12:45	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 09:30	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-5
Lab Sample ID: 180-182961-4
Date Collected: 11/14/24 15:45
Matrix: Water
Date Received: 11/16/24 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	484985	11/21/24 16:53	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		5	1 mL	1 mL	484985	11/21/24 17:07	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		5			636691	11/26/24 05:36	RKT	EET CLE
	Instrument ID: I9									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 20:06	AJC	EET CLE
	Instrument ID: I14									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636748	11/26/24 02:49	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:13	TQ6W	EET CLE
	Instrument ID: H11									
Total/NA	Analysis	EPA 9040C		1			485028	11/21/24 14:10	BAB	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	484737	11/19/24 09:41	EBA	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			1007.13 mL	1.0 g	690430	11/25/24 09:43	BCE	EET SL
Total/NA	Analysis	9315		1			694357	12/18/24 18:10	SCB	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Prep	PrecSep_0			1007.13 mL	1.0 g	690431	11/25/24 09:46	BCE	EET SL
Total/NA	Analysis	9320		1			693477	12/13/24 11:28	FLC	EET SL
	Instrument ID: GFPCRED									
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 09:30	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-6I
Lab Sample ID: 180-182961-5
Date Collected: 11/13/24 08:41
Matrix: Water
Date Received: 11/16/24 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	484985	11/21/24 17:25	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			636493	11/22/24 21:52	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 20:09	AJC	EET CLE
	Instrument ID: I14									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636748	11/26/24 02:57	AJC	EET CLE
	Instrument ID: I14									

Client Sample ID: CCR-AP-6I
Date Collected: 11/13/24 08:41
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:15	TQ6W	EET CLE
	Instrument ID: H11									
Total/NA	Analysis	EPA 9040C		1			485028	11/21/24 14:05	BAB	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	484667	11/18/24 11:43	EBA	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			989.18 mL	1.0 g	690430	11/25/24 09:43	BCE	EET SL
Total/NA	Analysis	9315		1			694357	12/18/24 18:10	SCB	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Prep	PrecSep_0			989.18 mL	1.0 g	690431	11/25/24 09:46	BCE	EET SL
Total/NA	Analysis	9320		1			693477	12/13/24 11:28	FLC	EET SL
	Instrument ID: GFPCRED									
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 09:30	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: CCR-AP-9
Date Collected: 11/14/24 10:50
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		2.5	1 mL	1 mL	484985	11/21/24 18:10	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			636493	11/22/24 21:56	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 20:12	AJC	EET CLE
	Instrument ID: I14									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636748	11/26/24 02:59	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:20	TQ6W	EET CLE
	Instrument ID: H11									
Total/NA	Analysis	EPA 9040C		1			485167	11/23/24 09:44	BAB	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	484667	11/18/24 11:43	EBA	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			525.00 mL	1.0 g	690430	11/25/24 09:43	BCE	EET SL
Total/NA	Analysis	9315		1			694357	12/18/24 18:10	SCB	EET SL
	Instrument ID: GFPCBLUE									
Total/NA	Prep	PrecSep_0			525.00 mL	1.0 g	690431	11/25/24 09:46	BCE	EET SL
Total/NA	Analysis	9320		1			693477	12/13/24 11:28	FLC	EET SL
	Instrument ID: GFPCRED									

Client Sample ID: CCR-AP-9

Date Collected: 11/14/24 10:50
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 09:30	FLC	EET SL

Client Sample ID: CCR-AP-11

Date Collected: 11/15/24 08:58
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	484985	11/21/24 18:24	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		5	1 mL	1 mL	484985	11/21/24 18:39	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			636493	11/22/24 22:01	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 20:15	AJC	EET CLE
	Instrument ID: I14									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636748	11/26/24 03:02	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:22	TQ6W	EET CLE
	Instrument ID: H11									
Total/NA	Analysis	EPA 9040C		1			485167	11/23/24 09:44	BAB	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	484659	11/18/24 11:34	EBA	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			741.62 mL	1.0 g	690430	11/25/24 09:43	BCE	EET SL
Total/NA	Analysis	9315		1			694358	12/18/24 18:09	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Prep	PrecSep_0			741.62 mL	1.0 g	690431	11/25/24 09:46	BCE	EET SL
Total/NA	Analysis	9320		1			693477	12/13/24 11:28	FLC	EET SL
	Instrument ID: GFPCRED									
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 09:30	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: DUP-1

Date Collected: 11/14/24 00:00
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	484985	11/21/24 18:54	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		5	1 mL	1 mL	484985	11/21/24 19:09	SJM	EET PIT
	Instrument ID: CHICS2100B									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-182961-1
SDG: FB Culley East

Client Sample ID: DUP-1

Date Collected: 11/14/24 00:00
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			636493	11/22/24 22:13	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 20:17	AJC	EET CLE
	Instrument ID: I14									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636748	11/26/24 03:05	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:23	TQ6W	EET CLE
	Instrument ID: H11									
Total/NA	Analysis	EPA 9040C		1			485028	11/21/24 14:19	BAB	EET PIT
	Instrument ID: OZ									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	484645	11/18/24 10:34	EBA	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			985.52 mL	1.0 g	690430	11/25/24 09:43	BCE	EET SL
Total/NA	Analysis	9315		1			694358	12/18/24 18:10	SCB	EET SL
	Instrument ID: GFPCPURPLE									
Total/NA	Prep	PrecSep_0			985.52 mL	1.0 g	690431	11/25/24 09:46	BCE	EET SL
Total/NA	Analysis	9320		1			693477	12/13/24 11:28	FLC	EET SL
	Instrument ID: GFPCRED									
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 09:30	FLC	EET SL
	Instrument ID: NOEQUIP									

Client Sample ID: FIELD BLANK 1

Date Collected: 11/15/24 11:55
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-9

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1	1 mL	1 mL	484985	11/21/24 19:27	SJM	EET PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6010D		1			636493	11/22/24 22:18	KLC	EET CLE
	Instrument ID: I12									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636305	11/21/24 20:20	AJC	EET CLE
	Instrument ID: I14									
Total Recoverable	Prep	3005A			50 mL	50 mL	636038	11/20/24 14:00	S4FJ	EET CLE
Total Recoverable	Analysis	EPA 6020B		1			636748	11/26/24 03:08	AJC	EET CLE
	Instrument ID: I14									
Total/NA	Prep	7470A			50 mL	50 mL	636040	11/20/24 14:00	S4FJ	EET CLE
Total/NA	Analysis	EPA 7470A		1			636245	11/21/24 12:25	TQ6W	EET CLE
	Instrument ID: H11									

Lab Chronicle

Client: Haley & Aldrich, Inc.
Project/Site: CCR Groundwater Monitoring FB Culley East

Job ID: 180-182961-1
SDG: FB Culley East

Client Sample ID: FIELD BLANK 1

Date Collected: 11/15/24 11:55
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-9

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9040C		1			485167	11/23/24 09:44	BAB	EET PIT
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	484667	11/18/24 11:43	EBA	EET PIT
	Instrument ID: NOEQUIP									
Total/NA	Prep	PrecSep-21			996.81 mL	1.0 g	690430	11/25/24 09:43	BCE	EET SL
Total/NA	Analysis	9315		1			694324	12/18/24 18:12	SCB	EET SL
	Instrument ID: GFPCRED									
Total/NA	Prep	PrecSep_0			996.81 mL	1.0 g	690431	11/25/24 09:46	BCE	EET SL
Total/NA	Analysis	9320		1			693477	12/13/24 11:29	FLC	EET SL
	Instrument ID: GFPCRED									
Total/NA	Analysis	Ra226_Ra228		1			695373	12/26/24 18:01	FLC	EET SL
	Instrument ID: NOEQUIP									

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Analyst References:

Lab: EET CLE
- Batch Type: Prep
  - S4FJ = Katherine Wise
- Batch Type: Analysis
  - AJC = Alexander Colosi
  - KLC = Karen Counts
  - RKT = Roger Toth
  - TQ6W = Bryan Pere ka

Lab: EET PIT
- Batch Type: Analysis
  - BAB = Brooke Batyi
  - EBA = Elizabeth Arbster
  - SJM = Shannon Mueller

Lab: EET SL
- Batch Type: Prep
  - BCE = Benjamin Celeslie
- Batch Type: Analysis
  - FLC = Fernando Cruz
  - SCB = Sarah Bernsen

Client Sample ID: CCR-AP-1R

Date Collected: 11/14/24 06:45
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-1

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	28		1.0	0.71	mg/L			11/21/24 15:21	1
Fluoride	0.40		0.10	0.026	mg/L			11/21/24 15:21	1
Sulfate	160		1.0	0.76	mg/L			11/21/24 15:21	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.79		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 21:35	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.0010	J	0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 19:52	1
Arsenic	0.011		0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 19:52	1
Barium	0.20		0.0050	0.00077	mg/L		11/20/24 14:00	11/21/24 19:52	1
Beryllium	0.0015		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 19:52	1
Cadmium	0.00034	J	0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 19:52	1
Calcium	55		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 19:52	1
Chromium	0.034		0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 19:52	1
Cobalt	0.018		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 19:52	1
Lead	0.018		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 19:52	1
Lithium	0.067		0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 19:52	1
Molybdenum	0.0056		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 19:52	1
Selenium	0.0013	J	0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 19:52	1
Thallium	0.00092	J *+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 19:52	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:08	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	700		20	20	mg/L			11/18/24 11:43	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	7.4	HF	0.1	0.1	SU			11/23/24 09:44	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.10		0.384	0.397	1.00	0.417	pCi/L	11/22/24 09:22	12/16/24 20:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*60.2*		*30 - 110*	*11/22/24 09:22*	*12/16/24 20:57*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.28	U G	1.74	1.75	1.00	2.68	pCi/L	11/22/24 12:14	12/11/24 12:45	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*60.2*		*30 - 110*	*11/22/24 12:14*	*12/11/24 12:45*	*1*

Client Sample ID: CCR-AP-1R
Lab Sample ID: 180-182961-1

Date Collected: 11/14/24 06:45
Matrix: Water
Date Received: 11/16/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Y Carrier	60.9		30 - 110	11/22/24 12:14	12/11/24 12:45	1

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	3.38		1.78	1.79	5.00	2.68	pCi/L		12/26/24 09:30	1

Client Sample ID: CCR-AP-2
Date Collected: 11/14/24 08:05
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-2
Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	190		1.0	0.71	mg/L			11/21/24 15:51	1
Fluoride	0.24		0.10	0.026	mg/L			11/21/24 15:51	1
Sulfate	420		10	7.6	mg/L			11/21/24 16:06	10

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	9.2		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 21:39	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 19:55	1
Arsenic	0.0021	J	0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 19:55	1
Barium	0.045		0.0050	0.00077	mg/L		11/20/24 14:00	11/21/24 19:55	1
Beryllium	ND		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 19:55	1
Cadmium	0.00011	J	0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 19:55	1
Calcium	230		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 19:55	1
Chromium	0.0024	J	0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 19:55	1
Cobalt	0.0080		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 19:55	1
Lead	0.0013		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 19:55	1
Lithium	0.0038	J	0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 19:55	1
Molybdenum	ND		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 19:55	1
Selenium	ND		0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 19:55	1
Thallium	ND	*+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 19:55	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:10	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	1500		10	10	mg/L			11/18/24 11:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	6.8	HF	0.1	0.1	SU			11/23/24 09:44	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.401	U	0.304	0.306	1.00	0.450	pCi/L	11/22/24 09:22	12/16/24 20:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*55.6*		*30 - 110*	*11/22/24 09:22*	*12/16/24 20:57*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.42	U G	1.50	1.51	1.00	2.44	pCi/L	11/22/24 12:14	12/11/24 12:45	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*55.6*		*30 - 110*	*11/22/24 12:14*	*12/11/24 12:45*	*1*

Client Sample ID: CCR-AP-2
Lab Sample ID: 180-182961-2

Date Collected: 11/14/24 08:05
Matrix: Water
Date Received: 11/16/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*66.9*		*30 - 110*	*11/22/24 12:14*	*12/11/24 12:45*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.82	U	1.53	1.54	5.00	2.44	pCi/L		12/26/24 09:30	1

Client Sample ID: CCR-AP-4

Date Collected: 11/14/24 13:20
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-3

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	26		1.0	0.71	mg/L			11/21/24 16:23	1
Fluoride	0.89		0.10	0.026	mg/L			11/21/24 16:23	1
Sulfate	12		1.0	0.76	mg/L			11/21/24 16:23	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.58		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 21:43	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.00096	J	0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 20:03	1
Arsenic	0.089		0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 20:03	1
Barium	0.52		0.0050	0.00077	mg/L		11/20/24 14:00	11/26/24 02:46	1
Beryllium	0.00099	J	0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 20:03	1
Cadmium	0.00045	J	0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 20:03	1
Calcium	140		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 20:03	1
Chromium	0.027		0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 20:03	1
Cobalt	0.014		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 20:03	1
Lead	0.019		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 20:03	1
Lithium	0.020		0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 20:03	1
Molybdenum	0.0073		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 20:03	1
Selenium	0.0018	J	0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 20:03	1
Thallium	ND	*+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 20:03	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	740		20	20	mg/L			11/18/24 11:43	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	6.9	HF	0.1	0.1	SU			11/23/24 09:44	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.852		0.371	0.379	1.00	0.441	pCi/L	11/22/24 09:22	12/16/24 20:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*57.6*		*30 - 110*	*11/22/24 09:22*	*12/16/24 20:58*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.598	U G	1.24	1.24	1.00	2.17	pCi/L	11/22/24 12:14	12/11/24 12:45	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*57.6*		*30 - 110*	*11/22/24 12:14*	*12/11/24 12:45*	*1*

Client Sample ID: CCR-AP-4
Lab Sample ID: 180-182961-3

Date Collected: 11/14/24 13:20
Matrix: Water
Date Received: 11/16/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*69.9*		*30 - 110*	*11/22/24 12:14*	*12/11/24 12:45*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.45	U	1.29	1.30	5.00	2.17	pCi/L		12/26/24 09:30	1

Client Sample ID: CCR-AP-5

Date Collected: 11/14/24 15:45
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-4

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**51**		1.0	0.71	mg/L			11/21/24 16:53	1
Fluoride	**1.7**		0.10	0.026	mg/L			11/21/24 16:53	1
Sulfate	**450**		5.0	3.8	mg/L			11/21/24 17:07	5

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**11**		0.50	0.29	mg/L		11/20/24 14:00	11/26/24 05:36	5

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 20:06	1
Arsenic	**0.0013**	**J**	0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 20:06	1
Barium	**0.053**		0.0050	0.00077	mg/L		11/20/24 14:00	11/26/24 02:49	1
Beryllium	ND		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 20:06	1
Cadmium	**0.00010**	**J**	0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 20:06	1
Calcium	**200**		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 20:06	1
Chromium	ND		0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 20:06	1
Cobalt	**0.0023**		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 20:06	1
Lead	ND		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 20:06	1
Lithium	**0.080**		0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 20:06	1
Molybdenum	**0.34**		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 20:06	1
Selenium	ND		0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 20:06	1
Thallium	ND	*+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 20:06	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:13	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1200**		10	10	mg/L			11/19/24 09:41	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.7**	**HF**	0.1	0.1	SU			11/21/24 14:10	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.158**		0.102	0.103	1.00	0.136	pCi/L	11/25/24 09:43	12/18/24 18:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.7*		*30 - 110*	*11/25/24 09:43*	*12/18/24 18:10*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.153	U	0.355	0.355	1.00	0.701	pCi/L	11/25/24 09:46	12/13/24 11:28	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.7*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:28*	*1*

Client Sample ID: CCR-AP-5
Lab Sample ID: 180-182961-4

Date Collected: 11/14/24 15:45
Matrix: Water
Date Received: 11/16/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*74.4*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:28*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.00506	U	0.369	0.370	5.00	0.701	pCi/L		12/26/24 09:30	1

Client Sample ID: CCR-AP-6I

Date Collected: 11/13/24 08:41
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-5

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**31**		1.0	0.71	mg/L			11/21/24 17:25	1
Fluoride	**0.20**		0.10	0.026	mg/L			11/21/24 17:25	1
Sulfate	**140**		1.0	0.76	mg/L			11/21/24 17:25	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**0.14**		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 21:52	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 20:09	1
Arsenic	ND		0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 20:09	1
Barium	**0.21**		0.0050	0.00077	mg/L		11/20/24 14:00	11/26/24 02:57	1
Beryllium	ND		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 20:09	1
Cadmium	ND		0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 20:09	1
Calcium	**46**		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 20:09	1
Chromium	ND		0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 20:09	1
Cobalt	**0.00085**	**J**	0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 20:09	1
Lead	ND		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 20:09	1
Lithium	**0.0049**	**J**	0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 20:09	1
Molybdenum	**0.020**		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 20:09	1
Selenium	ND		0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 20:09	1
Thallium	ND	*+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 20:09	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:15	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**350**		10	10	mg/L			11/18/24 11:43	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.6**	**HF**	0.1	0.1	SU			11/21/24 14:05	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0927	U	0.105	0.106	1.00	0.171	pCi/L	11/25/24 09:43	12/18/24 18:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.6*		*30 - 110*	*11/25/24 09:43*	*12/18/24 18:10*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.844**		0.458	0.465	1.00	0.637	pCi/L	11/25/24 09:46	12/13/24 11:28	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.6*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:28*	*1*

Client Sample ID: CCR-AP-6I
Date Collected: 11/13/24 08:41
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-5
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*76.3*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:28*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.937**		0.470	0.477	5.00	0.637	pCi/L		12/26/24 09:30	1

Client Sample ID: CCR-AP-9
Lab Sample ID: 180-182961-6

Date Collected: 11/14/24 10:50
Matrix: Water
Date Received: 11/16/24 09:30

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**2.5**		2.5	1.8	mg/L			11/21/24 18:10	2.5
Fluoride	**0.15**	**J**	0.25	0.065	mg/L			11/21/24 18:10	2.5
Sulfate	ND		2.5	1.9	mg/L			11/21/24 18:10	2.5

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**0.41**		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 21:56	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 20:12	1
Arsenic	**0.0022**	**J**	0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 20:12	1
Barium	**0.16**		0.0050	0.00077	mg/L		11/20/24 14:00	11/26/24 02:59	1
Beryllium	ND		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 20:12	1
Cadmium	**0.000077**	**J**	0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 20:12	1
Calcium	**120**		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 20:12	1
Chromium	**0.0065**		0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 20:12	1
Cobalt	**0.0025**		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 20:12	1
Lead	**0.0024**		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 20:12	1
Lithium	**0.035**		0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 20:12	1
Molybdenum	**0.0017**	**J**	0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 20:12	1
Selenium	ND		0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 20:12	1
Thallium	ND	*+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 20:12	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:20	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**710**		20	20	mg/L			11/18/24 11:43	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.2**	**HF**	0.1	0.1	SU			11/23/24 09:44	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**2.63**		0.589	0.635	1.00	0.522	pCi/L	11/25/24 09:43	12/18/24 18:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*55.6*		*30 - 110*	*11/25/24 09:43*	*12/18/24 18:10*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**3.70**	**G**	1.51	1.55	1.00	2.00	pCi/L	11/25/24 09:46	12/13/24 11:28	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*55.6*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:28*	*1*

Client Sample ID: CCR-AP-9
Date Collected: 11/14/24 10:50
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-6
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Y Carrier	75.1		30 - 110	11/25/24 09:46	12/13/24 11:28	1

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	6.33		1.62	1.68	5.00	2.00	pCi/L		12/26/24 09:30	1

Client Sample ID: CCR-AP-11

Date Collected: 11/15/24 08:58
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-7

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**29**		1.0	0.71	mg/L			11/21/24 18:24	1
Fluoride	**0.34**		0.10	0.026	mg/L			11/21/24 18:24	1
Sulfate	**610**		5.0	3.8	mg/L			11/21/24 18:39	5

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**0.45**		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 22:01	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 20:15	1
Arsenic	**0.051**		0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 20:15	1
Barium	**0.23**		0.0050	0.00077	mg/L		11/20/24 14:00	11/26/24 03:02	1
Beryllium	ND		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 20:15	1
Cadmium	ND		0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 20:15	1
Calcium	**140**		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 20:15	1
Chromium	**0.0021**	**J**	0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 20:15	1
Cobalt	**0.065**		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 20:15	1
Lead	**0.00051**	**J**	0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 20:15	1
Lithium	**0.0043**	**J**	0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 20:15	1
Molybdenum	ND		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 20:15	1
Selenium	ND		0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 20:15	1
Thallium	ND	*+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 20:15	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:22	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1200**		10	10	mg/L			11/18/24 11:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**6.2**	**HF**	0.1	0.1	SU			11/23/24 09:44	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.243**		0.161	0.163	1.00	0.229	pCi/L	11/25/24 09:43	12/18/24 18:09	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.7*		*30 - 110*	*11/25/24 09:43*	*12/18/24 18:09*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.965	U	0.650	0.656	1.00	0.980	pCi/L	11/25/24 09:46	12/13/24 11:28	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.7*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:28*	*1*

Client Sample ID: CCR-AP-11
Lab Sample ID: 180-182961-7

Date Collected: 11/15/24 08:58
Matrix: Water
Date Received: 11/16/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Y Carrier	77.4		30 - 110	11/25/24 09:46	12/13/24 11:28	1

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.21		0.670	0.676	5.00	0.980	pCi/L		12/26/24 09:30	1

Client Sample ID: DUP-1
Date Collected: 11/14/24 00:00
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-8
Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**54**		1.0	0.71	mg/L			11/21/24 18:54	1
Fluoride	**1.8**		0.10	0.026	mg/L			11/21/24 18:54	1
Sulfate	**450**		5.0	3.8	mg/L			11/21/24 19:09	5

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**12**		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 22:13	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 20:17	1
Arsenic	**0.0015**	**J**	0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 20:17	1
Barium	**0.051**		0.0050	0.00077	mg/L		11/20/24 14:00	11/26/24 03:05	1
Beryllium	ND		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 20:17	1
Cadmium	**0.000088**	**J**	0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 20:17	1
Calcium	**200**		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 20:17	1
Chromium	ND		0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 20:17	1
Cobalt	**0.0023**		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 20:17	1
Lead	ND		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 20:17	1
Lithium	**0.083**		0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 20:17	1
Molybdenum	**0.34**		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 20:17	1
Selenium	ND		0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 20:17	1
Thallium	ND	*+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 20:17	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:23	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1200**		10	10	mg/L			11/18/24 10:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**7.6**	**HF**	0.1	0.1	SU			11/21/24 14:19	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.212**		0.124	0.125	1.00	0.165	pCi/L	11/25/24 09:43	12/18/24 18:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.9*		*30 - 110*	*11/25/24 09:43*	*12/18/24 18:10*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.460	U	0.451	0.453	1.00	0.725	pCi/L	11/25/24 09:46	12/13/24 11:28	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.9*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:28*	*1*

Client Sample ID: DUP-1
Date Collected: 11/14/24 00:00
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-8
Matrix: Water

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*75.9*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:28*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.673	U	0.468	0.470	5.00	0.725	pCi/L		12/26/24 09:30	1

Client Sample ID: FIELD BLANK 1

Date Collected: 11/15/24 11:55
Date Received: 11/16/24 09:30

Lab Sample ID: 180-182961-9

Matrix: Water

Method: SW846 EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.71	mg/L			11/21/24 19:27	1
Fluoride	ND		0.10	0.026	mg/L			11/21/24 19:27	1
Sulfate	ND		1.0	0.76	mg/L			11/21/24 19:27	1

Method: SW846 EPA 6010D - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 22:18	1

Method: SW846 EPA 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 20:20	1
Arsenic	ND		0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 20:20	1
Barium	ND		0.0050	0.00077	mg/L		11/20/24 14:00	11/26/24 03:08	1
Beryllium	ND		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 20:20	1
Cadmium	ND		0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 20:20	1
Calcium	ND		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 20:20	1
Chromium	ND		0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 20:20	1
Cobalt	ND		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 20:20	1
Lead	ND		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 20:20	1
Lithium	ND		0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 20:20	1
Molybdenum	ND		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 20:20	1
Selenium	ND		0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 20:20	1
Thallium	ND	*+	0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 20:20	1

Method: SW846 EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 12:25	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	ND		10	10	mg/L			11/18/24 11:43	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 EPA 9040C)	**5.6**	**HF**	0.1	0.1	SU			11/23/24 09:44	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.166**		0.108	0.109	1.00	0.144	pCi/L	11/25/24 09:43	12/18/24 18:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.2*		*30 - 110*	*11/25/24 09:43*	*12/18/24 18:12*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.630**		0.396	0.400	1.00	0.573	pCi/L	11/25/24 09:46	12/13/24 11:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.2*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:29*	*1*

Client Sample ID: FIELD BLANK 1
Lab Sample ID: 180-182961-9

Date Collected: 11/15/24 11:55
Matrix: Water
Date Received: 11/16/24 09:30

Method: SW846 9320 - Radium-228 (GFPC) (Continued)

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Y Carrier	*82.6*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:29*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.796**		0.410	0.415	5.00	0.573	pCi/L		12/26/24 18:01	1

Method: EPA 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 180-484985/6
Matrix: Water
Analysis Batch: 484985

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.71	mg/L			11/21/24 11:58	1
Fluoride	ND		0.10	0.026	mg/L			11/21/24 11:58	1
Sulfate	ND		1.0	0.76	mg/L			11/21/24 11:58	1

Lab Sample ID: LCS 180-484985/7
Matrix: Water
Analysis Batch: 484985

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	50.0	48.9		mg/L		98	80 - 120
Fluoride	2.50	2.57		mg/L		103	80 - 120
Sulfate	50.0	50.8		mg/L		102	80 - 120

Method: EPA 6010D - Metals (ICP)

Lab Sample ID: MB 240-636038/1-A
Matrix: Water
Analysis Batch: 636493

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 636038

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.10	0.057	mg/L		11/20/24 14:00	11/22/24 20:55	1

Lab Sample ID: LCS 240-636038/2-A
Matrix: Water
Analysis Batch: 636493

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 636038

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1.00	1.07		mg/L		107	80 - 120

Method: EPA 6020B - Metals (ICP/MS)

Lab Sample ID: MB 240-636038/1-A
Matrix: Water
Analysis Batch: 636305

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 636038

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0020	0.00057	mg/L		11/20/24 14:00	11/21/24 19:32	1
Arsenic	ND		0.0050	0.00075	mg/L		11/20/24 14:00	11/21/24 19:32	1
Barium	ND		0.0050	0.00077	mg/L		11/20/24 14:00	11/21/24 19:32	1
Beryllium	ND		0.0010	0.00027	mg/L		11/20/24 14:00	11/21/24 19:32	1
Cadmium	ND		0.0010	0.000077	mg/L		11/20/24 14:00	11/21/24 19:32	1
Calcium	ND		1.0	0.25	mg/L		11/20/24 14:00	11/21/24 19:32	1
Chromium	ND		0.0050	0.0012	mg/L		11/20/24 14:00	11/21/24 19:32	1
Cobalt	ND		0.0010	0.000086	mg/L		11/20/24 14:00	11/21/24 19:32	1
Lead	ND		0.0010	0.00045	mg/L		11/20/24 14:00	11/21/24 19:32	1
Lithium	ND		0.0080	0.0034	mg/L		11/20/24 14:00	11/21/24 19:32	1
Molybdenum	ND		0.0050	0.0011	mg/L		11/20/24 14:00	11/21/24 19:32	1
Selenium	ND		0.0050	0.00089	mg/L		11/20/24 14:00	11/21/24 19:32	1
Thallium	ND		0.0010	0.00051	mg/L		11/20/24 14:00	11/21/24 19:32	1

Method: EPA 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 240-636038/1-A
Matrix: Water
Analysis Batch: 636748

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 636038

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND		0.0050	0.00077	mg/L		11/20/24 14:00	11/26/24 02:25	1

Lab Sample ID: LCS 240-636038/3-A
Matrix: Water
Analysis Batch: 636305

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 636038

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.100	0.102		mg/L		102	80 - 120
Arsenic	1.00	0.969		mg/L		97	80 - 120
Barium	1.00	0.983		mg/L		98	80 - 120
Beryllium	0.500	0.503		mg/L		101	80 - 120
Cadmium	0.500	0.482		mg/L		96	80 - 120
Calcium	25.0	25.0		mg/L		100	80 - 120
Chromium	0.500	0.497		mg/L		99	80 - 120
Cobalt	0.500	0.505		mg/L		101	80 - 120
Lead	0.500	0.497		mg/L		99	80 - 120
Lithium	0.500	0.509		mg/L		102	80 - 120
Molybdenum	0.500	0.481		mg/L		96	80 - 120
Selenium	1.00	0.966		mg/L		97	80 - 120
Thallium	1.00	1.38	*+	mg/L		138	80 - 120

Lab Sample ID: LCS 240-636038/3-A
Matrix: Water
Analysis Batch: 636748

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 636038

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	1.00	0.996		mg/L		100	80 - 120

Method: EPA 7470A - Mercury (CVAA)

Lab Sample ID: MB 240-636040/1-A
Matrix: Water
Analysis Batch: 636245

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 636040

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		11/20/24 14:00	11/21/24 11:59	1

Lab Sample ID: LCS 240-636040/2-A
Matrix: Water
Analysis Batch: 636245

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 636040

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	0.00500	0.00475		mg/L		95	80 - 120

Method: EPA 9040C - pH

Lab Sample ID: LCS 180-485028/24
Matrix: Water
Analysis Batch: 485028

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
pH	7.00	7.0		SU		100	99 - 101

Lab Sample ID: LCS 180-485167/24
Matrix: Water
Analysis Batch: 485167

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
pH	7.00	7.0		SU		100	99 - 101

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 180-484645/2
Matrix: Water
Analysis Batch: 484645

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			11/18/24 10:34	1

Lab Sample ID: LCS 180-484645/1
Matrix: Water
Analysis Batch: 484645

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	417	394		mg/L		94	85 - 115

Lab Sample ID: 180-182961-8 DU
Matrix: Water
Analysis Batch: 484645

Client Sample ID: DUP-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	1200		1180		mg/L		0.2	10

Lab Sample ID: MB 180-484659/1
Matrix: Water
Analysis Batch: 484659

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			11/18/24 11:34	1

Lab Sample ID: LCS 180-484659/2
Matrix: Water
Analysis Batch: 484659

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	417	402		mg/L		96	85 - 115

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: MB 180-484667/1
Matrix: Water
Analysis Batch: 484667

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			11/18/24 11:43	1

Lab Sample ID: LCS 180-484667/2
Matrix: Water
Analysis Batch: 484667

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	417	386		mg/L		93	85 - 115

Lab Sample ID: 180-182961-9 DU
Matrix: Water
Analysis Batch: 484667

Client Sample ID: FIELD BLANK 1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	ND		ND		mg/L		NC	10

Lab Sample ID: MB 180-484737/1
Matrix: Water
Analysis Batch: 484737

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			11/19/24 09:41	1

Lab Sample ID: LCS 180-484737/2
Matrix: Water
Analysis Batch: 484737

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	417	398		mg/L		95	85 - 115

Lab Sample ID: 180-182961-4 DU
Matrix: Water
Analysis Batch: 484737

Client Sample ID: CCR-AP-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	1200		1220		mg/L		0.2	10

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-689970/1-A
Matrix: Water
Analysis Batch: 693993

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 689970

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.02322	U	0.0781	0.0781	1.00	0.146	pCi/L	11/22/24 09:22	12/16/24 18:01	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.4*		*30 - 110*	*11/22/24 09:22*	*12/16/24 18:01*	*1*

Method: 9315 - Radium-226 (GFPC) (Continued)

Lab Sample ID: LCS 160-689970/2-A
Matrix: Water
Analysis Batch: 693993

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 689970

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			9.58	9.841		1.06	1.00	0.138	pCi/L	103	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*91.1*		*30 - 110*

Lab Sample ID: MB 160-690430/1-A
Matrix: Water
Analysis Batch: 694357

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 690430

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.02793	U	0.0747	0.0747	1.00	0.140	pCi/L	11/25/24 09:43	12/18/24 18:09	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*81.5*		*30 - 110*	*11/25/24 09:43*	*12/18/24 18:09*	*1*

Lab Sample ID: LCS 160-690430/2-A
Matrix: Water
Analysis Batch: 694357

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 690430

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			9.58	9.247		1.02	1.00	0.121	pCi/L	97	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*87.6*		*30 - 110*

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-689999/1-A
Matrix: Water
Analysis Batch: 693092

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 689999

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2740	U	0.476	0.477	1.00	0.816	pCi/L	11/22/24 12:14	12/11/24 12:43	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.4*		*30 - 110*	*11/22/24 12:14*	*12/11/24 12:43*	*1*
Y Carrier	*65.4*		*30 - 110*	*11/22/24 12:14*	*12/11/24 12:43*	*1*

Method: 9320 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-689999/2-A
Matrix: Water
Analysis Batch: 693092

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 689999

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.27	9.882		1.46	1.00	0.746	pCi/L	119	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*91.1*		*30 - 110*
Y Carrier	*73.6*		*30 - 110*

Lab Sample ID: MB 160-690431/1-A
Matrix: Water
Analysis Batch: 693477

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 690431

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2666	U	0.347	0.348	1.00	0.578	pCi/L	11/25/24 09:46	12/13/24 11:27	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*81.5*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:27*	*1*
Y Carrier	*82.2*		*30 - 110*	*11/25/24 09:46*	*12/13/24 11:27*	*1*

Lab Sample ID: LCS 160-690431/2-A
Matrix: Water
Analysis Batch: 693477

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 690431

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.27	9.885		1.37	1.00	0.548	pCi/L	120	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*87.6*		*30 - 110*
Y Carrier	*79.3*		*30 - 110*

HPLC/IC

Analysis Batch: 484985

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total/NA	Water	EPA 9056A	
180-182961-2	CCR-AP-2	Total/NA	Water	EPA 9056A	
180-182961-2	CCR-AP-2	Total/NA	Water	EPA 9056A	
180-182961-3	CCR-AP-4	Total/NA	Water	EPA 9056A	
180-182961-4	CCR-AP-5	Total/NA	Water	EPA 9056A	
180-182961-4	CCR-AP-5	Total/NA	Water	EPA 9056A	
180-182961-5	CCR-AP-6I	Total/NA	Water	EPA 9056A	
180-182961-6	CCR-AP-9	Total/NA	Water	EPA 9056A	
180-182961-7	CCR-AP-11	Total/NA	Water	EPA 9056A	
180-182961-7	CCR-AP-11	Total/NA	Water	EPA 9056A	
180-182961-8	DUP-1	Total/NA	Water	EPA 9056A	
180-182961-8	DUP-1	Total/NA	Water	EPA 9056A	
180-182961-9	FIELD BLANK 1	Total/NA	Water	EPA 9056A	
MB 180-484985/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-484985/7	Lab Control Sample	Total/NA	Water	EPA 9056A	

Metals

Prep Batch: 636038

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total Recoverable	Water	3005A	
180-182961-2	CCR-AP-2	Total Recoverable	Water	3005A	
180-182961-3	CCR-AP-4	Total Recoverable	Water	3005A	
180-182961-4	CCR-AP-5	Total Recoverable	Water	3005A	
180-182961-5	CCR-AP-6I	Total Recoverable	Water	3005A	
180-182961-6	CCR-AP-9	Total Recoverable	Water	3005A	
180-182961-7	CCR-AP-11	Total Recoverable	Water	3005A	
180-182961-8	DUP-1	Total Recoverable	Water	3005A	
180-182961-9	FIELD BLANK 1	Total Recoverable	Water	3005A	
MB 240-636038/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-636038/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCS 240-636038/3-A	Lab Control Sample	Total Recoverable	Water	3005A	

Prep Batch: 636040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total/NA	Water	7470A	
180-182961-2	CCR-AP-2	Total/NA	Water	7470A	
180-182961-3	CCR-AP-4	Total/NA	Water	7470A	
180-182961-4	CCR-AP-5	Total/NA	Water	7470A	
180-182961-5	CCR-AP-6I	Total/NA	Water	7470A	
180-182961-6	CCR-AP-9	Total/NA	Water	7470A	
180-182961-7	CCR-AP-11	Total/NA	Water	7470A	
180-182961-8	DUP-1	Total/NA	Water	7470A	
180-182961-9	FIELD BLANK 1	Total/NA	Water	7470A	
MB 240-636040/1-A	Method Blank	Total/NA	Water	7470A	
LCS 240-636040/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 636245

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total/NA	Water	EPA 7470A	636040
180-182961-2	CCR-AP-2	Total/NA	Water	EPA 7470A	636040

Metals (Continued)

Analysis Batch: 636245 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-3	CCR-AP-4	Total/NA	Water	EPA 7470A	636040
180-182961-4	CCR-AP-5	Total/NA	Water	EPA 7470A	636040
180-182961-5	CCR-AP-6I	Total/NA	Water	EPA 7470A	636040
180-182961-6	CCR-AP-9	Total/NA	Water	EPA 7470A	636040
180-182961-7	CCR-AP-11	Total/NA	Water	EPA 7470A	636040
180-182961-8	DUP-1	Total/NA	Water	EPA 7470A	636040
180-182961-9	FIELD BLANK 1	Total/NA	Water	EPA 7470A	636040
MB 240-636040/1-A	Method Blank	Total/NA	Water	EPA 7470A	636040
LCS 240-636040/2-A	Lab Control Sample	Total/NA	Water	EPA 7470A	636040

Analysis Batch: 636305

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total Recoverable	Water	EPA 6020B	636038
180-182961-2	CCR-AP-2	Total Recoverable	Water	EPA 6020B	636038
180-182961-3	CCR-AP-4	Total Recoverable	Water	EPA 6020B	636038
180-182961-4	CCR-AP-5	Total Recoverable	Water	EPA 6020B	636038
180-182961-5	CCR-AP-6I	Total Recoverable	Water	EPA 6020B	636038
180-182961-6	CCR-AP-9	Total Recoverable	Water	EPA 6020B	636038
180-182961-7	CCR-AP-11	Total Recoverable	Water	EPA 6020B	636038
180-182961-8	DUP-1	Total Recoverable	Water	EPA 6020B	636038
180-182961-9	FIELD BLANK 1	Total Recoverable	Water	EPA 6020B	636038
MB 240-636038/1-A	Method Blank	Total Recoverable	Water	EPA 6020B	636038
LCS 240-636038/3-A	Lab Control Sample	Total Recoverable	Water	EPA 6020B	636038

Analysis Batch: 636493

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total Recoverable	Water	EPA 6010D	636038
180-182961-2	CCR-AP-2	Total Recoverable	Water	EPA 6010D	636038
180-182961-3	CCR-AP-4	Total Recoverable	Water	EPA 6010D	636038
180-182961-5	CCR-AP-6I	Total Recoverable	Water	EPA 6010D	636038
180-182961-6	CCR-AP-9	Total Recoverable	Water	EPA 6010D	636038
180-182961-7	CCR-AP-11	Total Recoverable	Water	EPA 6010D	636038
180-182961-8	DUP-1	Total Recoverable	Water	EPA 6010D	636038
180-182961-9	FIELD BLANK 1	Total Recoverable	Water	EPA 6010D	636038
MB 240-636038/1-A	Method Blank	Total Recoverable	Water	EPA 6010D	636038
LCS 240-636038/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6010D	636038

Analysis Batch: 636691

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-4	CCR-AP-5	Total Recoverable	Water	EPA 6010D	636038

Analysis Batch: 636748

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-3	CCR-AP-4	Total Recoverable	Water	EPA 6020B	636038
180-182961-4	CCR-AP-5	Total Recoverable	Water	EPA 6020B	636038
180-182961-5	CCR-AP-6I	Total Recoverable	Water	EPA 6020B	636038
180-182961-6	CCR-AP-9	Total Recoverable	Water	EPA 6020B	636038
180-182961-7	CCR-AP-11	Total Recoverable	Water	EPA 6020B	636038
180-182961-8	DUP-1	Total Recoverable	Water	EPA 6020B	636038
180-182961-9	FIELD BLANK 1	Total Recoverable	Water	EPA 6020B	636038
MB 240-636038/1-A	Method Blank	Total Recoverable	Water	EPA 6020B	636038

Metals (Continued)

Analysis Batch: 636748 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 240-636038/3-A	Lab Control Sample	Total Recoverable	Water	EPA 6020B	636038

General Chemistry

Analysis Batch: 484645

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-8	DUP-1	Total/NA	Water	SM 2540C	
MB 180-484645/2	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-484645/1	Lab Control Sample	Total/NA	Water	SM 2540C	
180-182961-8 DU	DUP-1	Total/NA	Water	SM 2540C	

Analysis Batch: 484659

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-2	CCR-AP-2	Total/NA	Water	SM 2540C	
180-182961-7	CCR-AP-11	Total/NA	Water	SM 2540C	
MB 180-484659/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-484659/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 484667

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total/NA	Water	SM 2540C	
180-182961-3	CCR-AP-4	Total/NA	Water	SM 2540C	
180-182961-5	CCR-AP-6I	Total/NA	Water	SM 2540C	
180-182961-6	CCR-AP-9	Total/NA	Water	SM 2540C	
180-182961-9	FIELD BLANK 1	Total/NA	Water	SM 2540C	
MB 180-484667/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-484667/2	Lab Control Sample	Total/NA	Water	SM 2540C	
180-182961-9 DU	FIELD BLANK 1	Total/NA	Water	SM 2540C	

Analysis Batch: 484737

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-4	CCR-AP-5	Total/NA	Water	SM 2540C	
MB 180-484737/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-484737/2	Lab Control Sample	Total/NA	Water	SM 2540C	
180-182961-4 DU	CCR-AP-5	Total/NA	Water	SM 2540C	

Analysis Batch: 485028

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-4	CCR-AP-5	Total/NA	Water	EPA 9040C	
180-182961-5	CCR-AP-6I	Total/NA	Water	EPA 9040C	
180-182961-8	DUP-1	Total/NA	Water	EPA 9040C	
LCS 180-485028/24	Lab Control Sample	Total/NA	Water	EPA 9040C	

Analysis Batch: 485167

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total/NA	Water	EPA 9040C	
180-182961-2	CCR-AP-2	Total/NA	Water	EPA 9040C	
180-182961-3	CCR-AP-4	Total/NA	Water	EPA 9040C	
180-182961-6	CCR-AP-9	Total/NA	Water	EPA 9040C	
180-182961-7	CCR-AP-11	Total/NA	Water	EPA 9040C	
180-182961-9	FIELD BLANK 1	Total/NA	Water	EPA 9040C	

General Chemistry (Continued)

Analysis Batch: 485167 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 180-485167/24	Lab Control Sample	Total/NA	Water	EPA 9040C	

Rad

Prep Batch: 689970

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total/NA	Water	PrecSep-21	
180-182961-2	CCR-AP-2	Total/NA	Water	PrecSep-21	
180-182961-3	CCR-AP-4	Total/NA	Water	PrecSep-21	
MB 160-689970/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-689970/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 689999

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-1	CCR-AP-1R	Total/NA	Water	PrecSep_0	
180-182961-2	CCR-AP-2	Total/NA	Water	PrecSep_0	
180-182961-3	CCR-AP-4	Total/NA	Water	PrecSep_0	
MB 160-689999/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-689999/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Prep Batch: 690430

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-4	CCR-AP-5	Total/NA	Water	PrecSep-21	
180-182961-5	CCR-AP-6I	Total/NA	Water	PrecSep-21	
180-182961-6	CCR-AP-9	Total/NA	Water	PrecSep-21	
180-182961-7	CCR-AP-11	Total/NA	Water	PrecSep-21	
180-182961-8	DUP-1	Total/NA	Water	PrecSep-21	
180-182961-9	FIELD BLANK 1	Total/NA	Water	PrecSep-21	
MB 160-690430/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-690430/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 690431

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-182961-4	CCR-AP-5	Total/NA	Water	PrecSep_0	
180-182961-5	CCR-AP-6I	Total/NA	Water	PrecSep_0	
180-182961-6	CCR-AP-9	Total/NA	Water	PrecSep_0	
180-182961-7	CCR-AP-11	Total/NA	Water	PrecSep_0	
180-182961-8	DUP-1	Total/NA	Water	PrecSep_0	
180-182961-9	FIELD BLANK 1	Total/NA	Water	PrecSep_0	
MB 160-690431/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-690431/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

18

NOT FOIL
RAD

	CCR-AP-1R	11/14/24	0645	500mL
1	CCR-AP-2	11/14/24	0805	650mL
1	CCR-AP-4	11/14/24	1320	450mL
2	CCR-AP-5	11/14/24	1545	—
2	CCR-AP-6I	11/13/24	0841	—
1	CCR-AP-9	11/14/24	1050	600mL
2	CCR-AP-11	11/15/24	0858	—
2	DUP-1	11/14/24	—	—
2	Field Blank	1	11/15/24	1155

180-182961 Chain of Custody

NO COC
[illegible] 11/16/24 0930

2 MS 0364
2 MSD
ILR 01/14/25

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins | Environment Testing

Client Information	Sampler: MARK BRETING	Lab PM: Johnson, Andy	Carrier Tracking No(s):	COC No: 180-106631-14505.2
Client Contact: Mark Breting	Phone: 317 313 8306	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin: IN	Page: Page 2 of 2
Company: Atlas Technical Consultants LLC	PWSID:	Analysis Requested		Job #:
Address: 7988 Centerpoint Drive Suite 100	Due Date Requested:			Preservation Codes: N None D HNO3
City: Indianapolis	TAT Requested (days):			
State, Zip: IN, 46256	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 0129420-032-001-01			Other:
Email: mark.breting@atcassociates.com	WO #: See Chain			
Project Name: CCR GW Monitoring FB Culley East	Project #: 18016014			
Site:	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9060C, 9056A_ORGFM_28D	2540C_Calcd TDS by 2540C	9315_Ra226, 9320_Ra228	6020B Metals by 6020B	7470A Hg by 7470A	6010D Boron by 6010D	Total Number of Containers	Special Instructions/Note:
			Preservation Code:											
CCR-AP-6I	11/13/24	08:41	G	W	N	N	X	X	X	X	X	X		
CCR-AP-1R	11/14/24	0645	G	W	N	N	X	X	X	X	X	X		Only 1 Radium Filtered
CCR-AP-2		08:05	G	W	N	N	X	X	X	X	X	X		" " "
CCR-AP-9		1050	G	W	N	N	X	X	X	X	X	X		" " "
CCR-AP-4R		1320	G	W	N	N	X	X	X	X	X	X		" " "
CCR-AP-5		1545	G	W	N	N	X	X	X	X	X	X		
DUP-1		0000	G	W	N	N	X	X	X	X	X	X		
CCR-AP-11	11/15/24	0858	G	W	N	N	X	X	X	X	X	X		
Field Blank 1	11/15/24	1155	G	W	N	N	X	X	X	X	X	X		

180-182961-02 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☑ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Mark Breting	11/15/24 1340	Atlas	FedEx	11/15/24 1340	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
				11/16/24 0930	ETHV
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.	Cooler Temperature(s) °C and Other Remarks:

Ver: 05/06/2024


Do Not Lift Using This Tag
Ref
Dep
Date 17Oct24
Wgt 55 00 LBS
DV:
SHIPPING 0 00
SPECIAL 0 00
HANDLING 0 00
0 00 TOTAL
Svcs: PRIORITY OVERNIGHT Master 7236 3963 9470
TRCK 7236 3963 9481
ORIGIN ID:ORFA (317) 579-4082
CRAIG KAISER
FB CULLEY VECTREN CORP
3711 DARLINGTON RD
NEWBURGH, IN 47630
UNITED STATES US
SHIP DATE 17OCT24
ACTWGT 55.00 LB MAN
CAD 0416933/CAFE3854
180-182981 Waybill
TO SAMPLE RECEIVING
EUROFINS
301 ALPHA DR
PITTSBURGH PA 15238
(412) 963-7058
REF
INV:
PO:
DEPT.
RMA.
FedEx Express
Uncorrected temp
Thermometer ID 4.1
CF -0.1
Initials
PT-WI-SR-001 effective 11/8/18
FedEx
TRK# 0221 7236 3963 9481
XO AGCA
SATURDAY 12:00P
PRIORITY OVERNIGH
15238
PA-US
#6190970 11/15 58CJS/582E/C8C4
CRAIG KAISER
FB CULLEY WEST/VECTREN CORP
3711 DARLINGTON RD.
NEWBURGH, IN 47630
UNITED STATES US
ACTWGT 55 00 LB MAN
CAD 0416933/CAFE3854
TO SAMPLE RECEIVING
EUROFINS
301 ALPHA DR
PITTSBURGH PA 15238
(412) 963-7058
REF:
PO:
DEPT.
RMA.
FedEx Express
Uncorrected temp
Thermometer ID 1.7
CF -0.1
Initials
PT-WI-SR-001 effective 11/8/18
FedEx
TRK# 0221 7236 3964 0280
XO AGCA
SATURDAY 12:00P
PRIORITY OVERNIGH
15238
PA-US
SDR
FedEx Express
Saturday Delivery

Do not lift using this tag.

CRAIG KAISER
FB CULLEY WEST VECTREN CORP
3711 DARLINGTON RD

NEWBURGH, IN 47630
UNITED STATES US

ACTWGT 55.00 LB MAN
CAD 0415933/CAFE3854

TO **SAMPLE RECEIVING**
EUROFINS
301 ALPHA DR

PITTSBURGH PA 15238
(412) 963-7058
INV:
PO:
REF:
DEPT:

RMA.

FedEx Express

FedEx
TRK# 0221 7236 3964 0224

SATURDAY 12:00P
PRIORITY OVERNIGHT

XO AGCA

15238
PA-US PIT

Uncorrected temp
Thermometer ID 1.8 17
CF -0.8 Initials
PT-WI-SR-001 effective 11/8/18

#618523 11/15 58CJ5/582E/C8C4

Part # 156469-494 MTW EXP 04/25

Part # 156297-435 BRDW2 EXP 02/25

CRAIG KAISER
FB CULLEY VECTREN CORP
3711 DARLINGTON RD

NEWBURGH, IN 47630
UNITED STATES US

ACTWGT 55.00 LB MAN
CAD 0415933/CAFE3854

TO **SAMPLE RECEIVING**
EUROFINS
301 ALPHA DR

PITTSBURGH PA 15238
(412) 963-7058
INV:
PO:
REF:
DEPT:

RMA.

FedEx Express

FedEx
TRK# 0221 7236 3963 9492

SATURDAY 12:00
PRIORITY OVERNIGH

XO AGCA

15238
PA-US PIT

Uncorrected temp
Thermometer ID 36 17
CF -0.1 Initials
PT-WI-SR-001 effective 11/8/18

#6190970 11/15 58CJ

Part # 156469-494 MTW EXP 04/25

Part # 156297-435 BRDW2 EXP 08/26

CRAIG KAISER
FB CULLEY VECTREN CORP
3711 DARLINGTON RD

NEWBURGH, IN 47630
UNITED STATES US

CAD 0415933/CAFE3654

TO SAMPLE RECEIVING
EUROFINS
301 ALPHA DR

PITTSBURGH PA 15238
(412) 963-7058 REF:
INV:
PO: DEPT:

RMA.

FedEx Express

FedEx
TRK# 0221 7236 3963 9518

SATURDAY 12:00
PRIORITY OVERNIGH

XO AGCA

15238
PA-US PIT

Uncorrected temp °C
Thermometer ID 24 17
CF -0.1 Initials SR
PT-WI-SR-001 effective 11/8/18

EXP 08/25

#6190970 11/15 58CJ5/5B2E/C6C4

Ref
Dep

Date 17Oct24
Wgt 35 00 LBS

SHIPPING
SPECIAL

0 00
0 00
0 00
0 00

DV

Svcs PRIORITY OVERNIGHT Master 7236 3963 9470
TRCK 7236 3963 9470

ORIGIN ID ORFA (317) 579-4082
CRAIG KAISER
FB CULLEY VECTREN CORP
3711 DARLINGTON RD

NEWBURGH, IN 47630
UNITED STATES US

TO SAMPLE RECEIVING
EUROFINS
301 ALPHA DR

PITTSBURGH PA 15238
(412) 963-7058 REF
INV:
PO: DEPT:

RMA.

FedEx Express

FedEx
TRK# 0221 7236 3963 9470

SATURDAY 12:00
PRIORITY OVERNIGH

XO AGCA

15238
PA-US PIT

Uncorrected temp °C
Thermometer ID 25 17
CF -0.1 Initials SR
PT-WI-SR-001 effective 11/8/18

EXP 08/25

#6190970 11/15 58CJ5/5B2E/C6C4

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins

Client Information (Sub Contract Lab)	Sampler: N/A	Lab PM: Johnson, Andy	Carrier Tracking No(s): N/A	COC No: 180-528237.1
Client Contact: Shipping/Receiving	Phone: N/A	E-Mail: Andy.Johnson@et.eurofinsus.com	State of Origin: Indiana	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): N/A		Job #: 180-182961-1
Address: 13715 Rider Trail North,	Due Date Requested: 12/26/2024			
City: Earth City	TAT Requested (days): N/A			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #: N/A			
Email: N/A	WO #: N/A			
Project Name: CCR Groundwater Monitoring FB Culley East	Project #: 18016014			
Site: N/A	SSOW#: N/A			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9315_Ra226/PrecSep_21 Radium-226 (GFPC) by 9315 (21-day decay)	9320_Ra228/PrecSep_0 Radium-228 (GFPC) by 9320	Ra226Ra228_GFPC/ Combined Radium-226 and Radium-228	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
CCR-AP-1R (180-182961-1)	11/14/24	06:45 Eastern	G	Water			X	X	X	1	
CCR-AP-2 (180-182961-2)	11/14/24	08:05 Eastern	G	Water			X	X	X	1	
CCR-AP-4R (180-182961-3)	11/14/24	13:20 Eastern	G	Water			X	X	X	1	
CCR-AP-5 (180-182961-4)	11/14/24	15:45 Eastern	G	Water			X	X	X	2	
CCR-AP-6I (180-182961-5)	11/13/24	08:41 Eastern	G	Water			X	X	X	2	
CCR-AP-9 (180-182961-6)	11/14/24	10:50 Eastern	G	Water			X	X	X	1	
CCR-AP-11 (180-182961-7)	11/15/24	08:58 Eastern	G	Water			X	X	X	2	
DUP-1 (180-182961-8)	11/14/24	Eastern	G	Water			X	X	X	2	
FIELD BLANK 1 (180-182961-9)	11/15/24	11:55 Eastern	G	Water			X	X	X	2	

Preservation Codes: -

Other: N/A

Note: Since laboratory accreditations are subject to change, Eurofins Pittsburgh places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Pittsburgh laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Pittsburgh attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Pittsburgh.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time: 11/27/1900	Company: EUHT	Received by: M. Pinette	Date/Time: NOV 19 2024 0910	Company
Relinquished by:	Date/Time:	Company	Received by: Meadow Pinette	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-182961-1
SDG Number: FB Culley East

Login Number: 182961
List Number: 1
Creator: Ryan, Shannon G

List Source: Eurofins Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	False	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	False	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

This receipt checklist is generated for all samples received in this Login. It may not be applicable to all Jobs associated with this Login.

Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 180-182961-1
SDG Number: FB Culley East

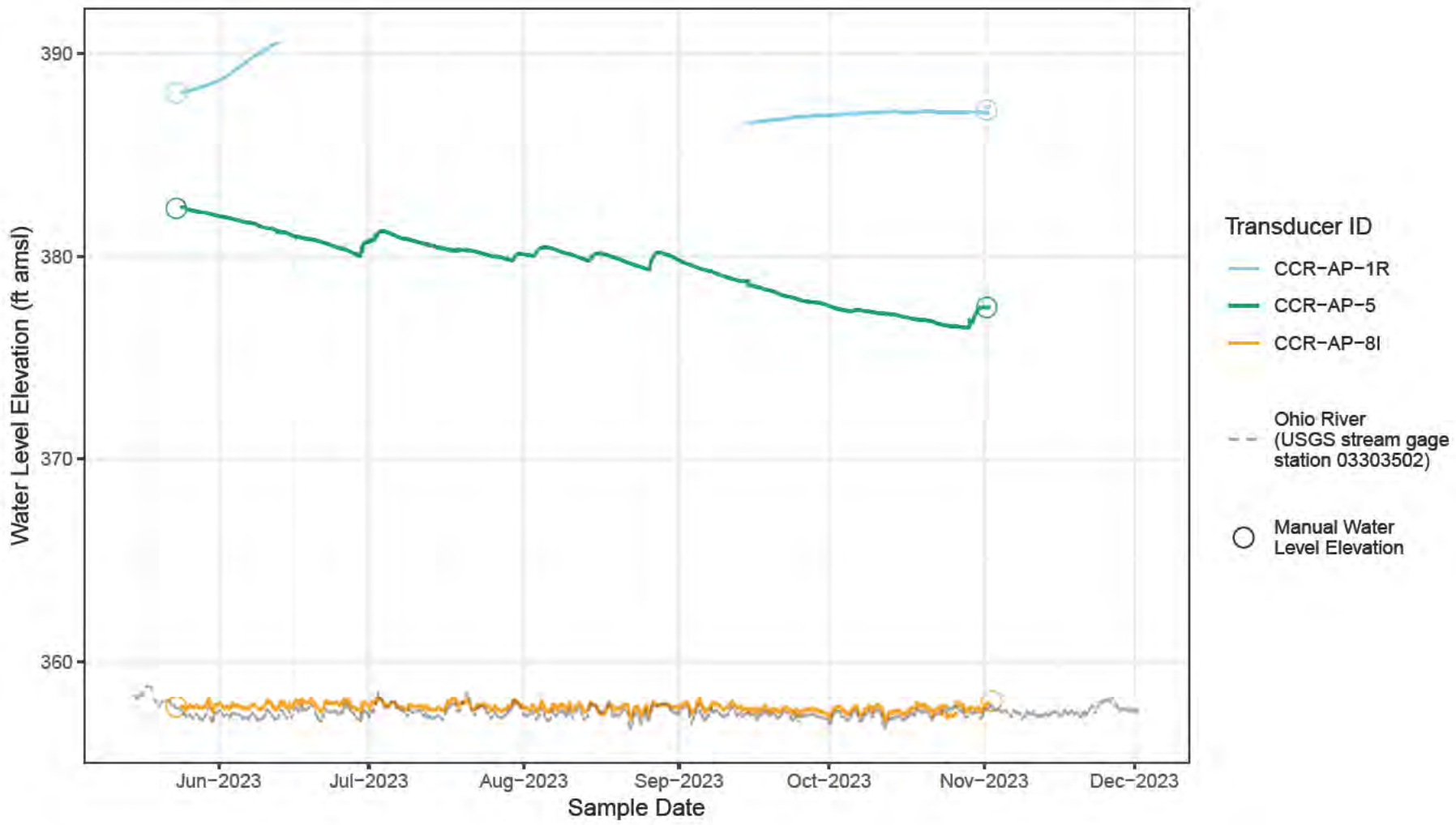
Login Number: 182961
List Number: 3
Creator: Pinette, Meadow L

List Source: Eurofins St. Louis
List Creation: 11/19/24 01:45 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

This receipt checklist is generated for all samples received in this Login. It may not be applicable to all Jobs associated with this Login.

APPENDIX D
Hydrographs



Notes:

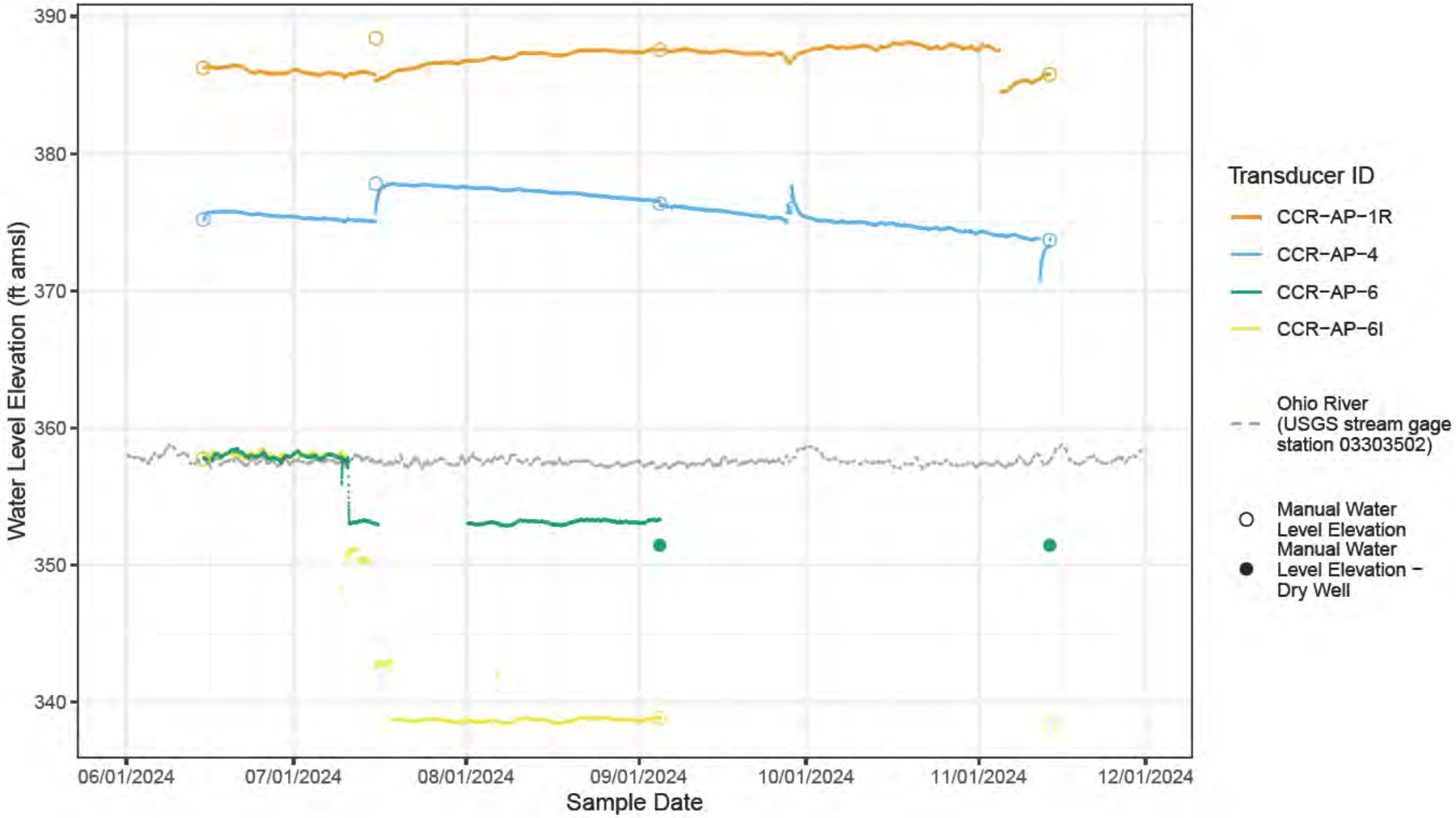
- Water Level Elevation (ft amsl) = top of riser (ft amsl) − adjusted trasducer water level (ft), where adjusted transducer water level = −(manual water level elevation − transducer water level).
- USGS stream gage station 03303502 is located on the Ohio River at Riverport, Owensboro, KY, USA.

APPENDIX D-1

EAST ASH POND HYDROGRAPHS OVER OHIO RIVER AT RIVERPORT GAGE HEIGHT

HALEY ALDRICH

JANUARY 2025



Notes:

- ft NAVD88 = feet relative to the NAVD88 datum
- USGS stream gage station 03303502 is located on the Ohio River at Riverport, Owensboro, KY, USA.

APPENDIX D-2

EAST ASH POND HYDROGRAPHS OVER OHIO RIVER AT RIVERPORT GAGE HEIGHT

HALEY ALDRICH

JANUARY 2025

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 149
New York Times Article on Trump's Coal Plant Policy

Trump Wants to Halt Almost All Coal Plant Shutdowns. It Could Get Messy.

Even as administration officials vowed this week to head off scheduled retirements, some aging plants are now breaking, and costs could run to the billions.

Listen to this article · 11:35 min Learn more




By Claire Brown and Brad Plumer

Jan. 16, 2026

Over the past eight months, the Energy Department has taken the extraordinary step of ordering that generators at five coal-burning power plants that had been headed for retirement stay open and keep running.

That's just the beginning, officials say.

At a White House event on Thursday, Trump administration officials said they planned to keep open as many coal plants as they could and prevent any further retirements over the next three years.

"The goal is to stop the political closure of coal plants," Chris Wright, the energy secretary, said during the first meeting of the National Coal Council, which had lapsed under the Biden administration but which President Trump has revived. Dozens of representatives from the coal industry were present.

The moves are part of a sweeping plan by Mr. Trump to revive America's coal industry, which has been declining for years. Mr. Trump has expressed a certain affection for the fuel, calling it "beautiful clean coal" to goad environmentalists, who note that coal is the dirtiest of fossil fuels and a major driver of global warming.

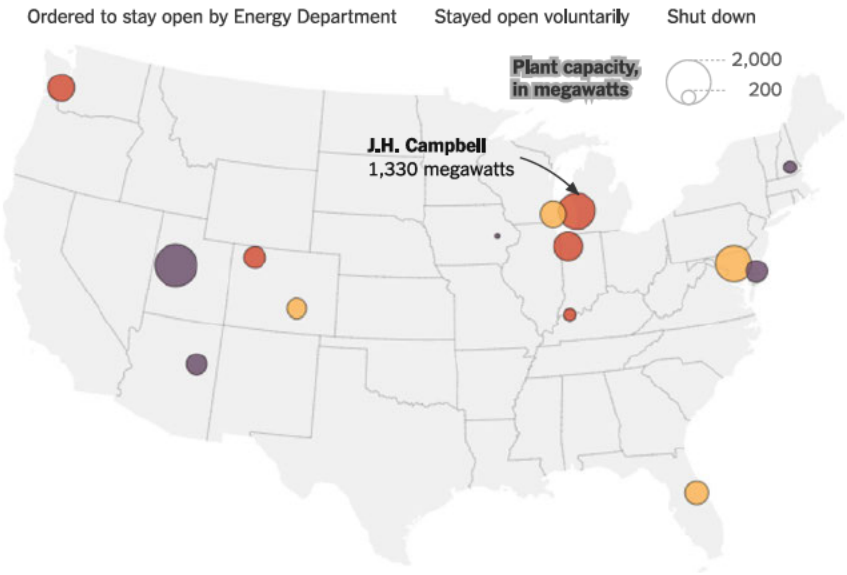
Administration officials say that keeping coal plants open is necessary to avoid blackouts and meet rising energy needs.

On the ground, however, efforts to halt coal retirements are already causing complications. Two of the coal units that the Energy Department ordered to stay online in December are broken, and it's unclear when they might be repaired.

Some plants that were ordered to keep running had already shuttered their coal mines and stopped maintaining old equipment. Now, utilities and operators are straining to revive them. The costs of extending coal-burning plants are significant, and federal and state regulators are embroiled in disputes over who will ultimately pay.

"These are old plants, and they are expensive to refurbish and keep open," said Ari Peskoe, director of Harvard Law School's Electricity Law Initiative. "The costs are going to fall on somebody. The question is whether it's the plant owners or the public."

Most coal units expected to close in 2025 were kept open



Source: U.S. Energy Information Administration. Brad Plumer/The New York Times

The debate over whether to keep aging coal plants open comes amid an astonishing turnaround in the coal industry's political fortunes.

Since 2005, the number of operating coal plants in the United States had been declining precipitously as utilities switched to cheaper and cleaner natural gas, wind and solar power. Even Mr. Trump in his first term couldn't stop the slide; more than 150 coal-burning units shut down between 2017 and 2020.

This time around, the Trump administration has gone much further to rescue coal, with more success. Last year, the amount of electricity produced by coal increased 13 percent, and retirements have slowed.

The administration has been aided by a surge in electricity demand nationwide driven by a boom in data centers, which has led some utilities to postpone coal plant closures. Federal agencies have also rolled back environmental regulations on coal, which produces more air pollution than other sources like natural gas. Burning coal also emits mercury, a powerful neurotoxin, and other heavy metals.



A surge in electricity demand has been driven by a boom in data centers. Scott Ball for The New York Times

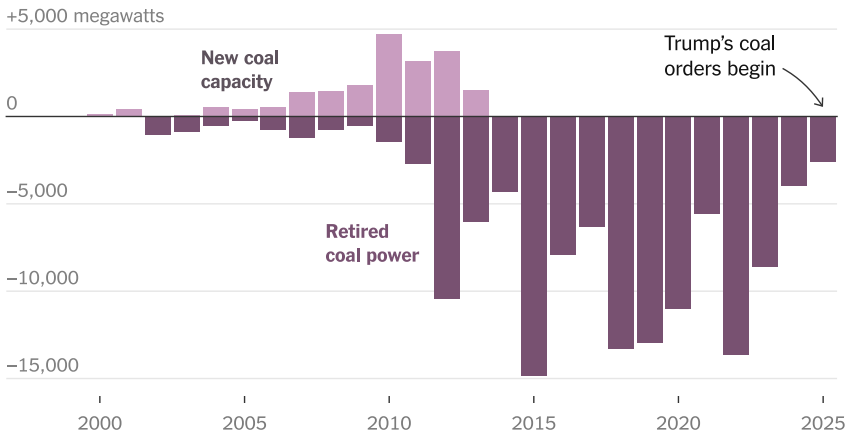
Even more drastic, however, has been the Energy Department's use of emergency orders to mandate that coal plants that had been set to retire keep operating, as the agency has invoked Section 202(c) of the Federal Power Act.

Historically, this provision has been used to keep plants online during temporary emergencies such as hurricanes or heat waves. But the Trump administration has claimed that the emergency this time is an expected shortage of reliable power over the next decade, and officials are trying to avert as many closures as they can.

The impact is already visible: At the start of last year, utilities were expected to close roughly 8.5 gigawatts of coal capacity in 2025, according to federal data. But they ended up retiring only 2.7 gigawatts, the lowest amount since 2011.

Coal retirements slowed in 2025

Changes in annual U.S. coal power capacity



Source: Energy Information Administration. Brad Plumer/The New York Times

At the White House event on Thursday, Mr. Wright said that many states were closing their coal plants for environmental reasons and that the administration would do everything it could to stop that. More than 20 gigawatts of coal capacity is currently scheduled to retire by 2028.

"I think you will not see those plants close during this administration," Mr. Wright said, adding that there might be a few exceptions for the very oldest plants.

Mr. Wright said he hoped other actions by the administration to support coal would eventually make emergency orders "unnecessary." But, he claimed, many utilities were quietly welcoming the orders to save coal plants at imminent risk of closure. "We get a lot of inbound calls now saying, 'Can you 202(c) this plant?'"

Those orders are also facing a backlash. Environmental groups and states like Michigan and Washington are mounting legal challenges. The grid operator in the Midwest and state officials in Colorado have said their regions already have adequate electrical capacity, even with coal retirements.



Mr. Wright, second from the right, said that many states were closing their coal plants for environmental reasons and that the administration would do everything it could to stop that. Tierney L. Cross/The New York Times

Even analysts who agree that the country needs more power plants that can run at all hours say that forcing aging coal units to stay online can be counterproductive, because they can distort energy markets and make it harder for states and companies to plan to bring new power plants online.

“Using a blunt instrument like this to keep the legacy coal fleet online could backfire,” said Devin Hartman, director of energy and environmental policy at the R Street Institute. “There are a ton of risks.”

Broken plants, busy railroads

Reviving a geriatric coal fleet isn’t easy: Many plants are more than 50 years old and need major repairs.

On the shores of Lake Michigan, the J.H. Campbell coal plant was set to retire last May under a plan backed by the state and the electric utility that operates it, Consumers Energy. But, at the last minute, the Energy Department ordered that the plant’s three coal units stay open for 90 days during the summer. The agency has since twice renewed the order and is widely expected to order that the plant remain open indefinitely.

That created headaches for the operator, which had canceled roughly $161 million in maintenance for the plant in the years leading up to the scheduled retirement, according to one engineer’s testimony. The plant has struggled to generate reliable power: One unit faced extended outages in June and produced electricity for only a handful of days, according to legal filings by environmental groups.

Other plants may be in rougher shape.

In December, the Energy Department ordered that the R.M. Schahfer plant in northern Indiana keep two coal units operating past their planned retirement. Yet one of those units has been offline since the summer because of a turbine failure.

Repairing the unit could ultimately take “six months or longer,” Vince Parisi, the chief operating officer of the Northern Indiana Public Service Company, which owns the plant, told regulators last month. “It’s just the reality of that unit being close to retirement.”

In Colorado, a rural electric cooperative had been planning since 2016 to close a coal-burning unit at the Craig Generating Station. Last month, the Energy Department ordered that the unit stay open. Yet the coal unit is offline because of a broken valve, and it is unclear how long it will take to fix it.

There's also the question of where to get fuel.

Until recently, the Craig unit in Colorado obtained some of its coal from a local mine operated by its part owner, the Tri-State Generation and Transmission Association. But that mine closed last year, laying off all its workers.

"This makes no economic sense or functional sense, to extend the life of an effectively broken coal plant," said Gov. Jared Polis, Democrat of Colorado, who opposes the order and says the federal government had done little to consult with the state.

Last month, when Bob Guenther drove past the coal-burning power plant in Centralia, Wash., where he worked for 34 years before retirement, there wasn't much coal in sight. The power plant had been winding down for years and was scheduled to close by Dec. 31 until the Energy Department ordered that it stay open. Coal piles that once filled acres had dwindled.

"It's going to cost a lot of money to put that plant back in shape," Mr. Guenther said.



The coal-burning power plant in Centralia, Wash. Reviving a geriatric coal fleet isn't easy. Evan McGlinn for The New York Times

Some local officials and unions have cheered the lifeline for coal plants, which are often an engine of local economic activity. But environmental groups have pointed to the hazards from air pollution and coal-ash waste.

"Northwest Indiana has long borne the brunt of industrial pollution," said Ashley Williams, the executive director of Just Transition Northwest Indiana, a nonprofit group, criticizing the order to keep the R.M. Schahfer plant open. "We will continue to suffer."

Mounting costs, legal threats

The cost to keep coal plants open could prove especially divisive.

In Michigan, Consumers Energy spent $164 million from May to September to keep its coal plant running, according to regulatory filings. During that time, the plant earned only $84 million in revenue.

It remains to be seen who will ultimately pay for the rest. Consumers Energy has proposed that the costs be shared by ratepayers in multiple states in the Midwestern regional grid, rather than paid for by its customers alone. But other groups have challenged this proposal.

In Colorado, Tri-State has said that its ratepayers may have to bear the full cost of repairing and operating the Craig plant — which state officials say could cost $80 million per year or more. In Washington, state law now forbids utilities to buy electricity from coal plants, raising legal complications.

Preventing the nation's coal plants from retiring over the next three years could cost consumers at least $3 billion per year, according to a report from Grid Strategies, a consulting firm.

"A lot of these plants were retiring because they're no longer economic to operate," said Michael Goggin, an executive vice president at Grid Strategies. "It's expensive to keep them going."

Opponents have challenged the coal orders in court, arguing that Congress intended for emergency powers to be used only in rare, temporary cases. If the orders are struck down, it is unclear who would bear the cost of spending millions of dollars to repair run-down plants.

While federal forecasts still expect coal generation to decline next year, the Trump administration is trying to prevent that from occurring.

The Environmental Protection Agency is rolling back numerous air pollution and climate rules that have made coal plants more costly to operate. It has also given electric utilities more time to clean up contamination from toxic coal ash landfills.

At the same time, the Energy Department has offered up to $350 million to try to bring back to life coal plants that have already closed.

Michelle Bloodworth, chief executive of America's Power, a coal trade group, estimates that at least 29 coal units with roughly 13 gigawatts of capacity have recently closed but are not yet demolished and could be candidates for restarting. She added that more utilities were voluntarily postponing coal retirements and that the future for the industry is looking brighter under the Trump administration.

"There's a huge opportunity for the coal fleet," Ms. Bloodworth said. "It's a big change after years and years of punitive environmental regulations."

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Brad Plumer is a Times reporter who covers technology and policy efforts to address global warming.

A version of this article appears in print on , Section A, Page 1 of the New York edition with the headline: Trump Pushes To Retain Coal On Power Grid

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 150
May Campbell Order

Order No. 202-25-3

Pursuant to the authority vested in the Secretary of Energy by section 202(c) of the Federal Power Act (FPA), 16 U.S.C. § 824a(c), and section 301(b) of the Department of Energy Organization Act, 42 U.S.C. § 7151(b), and for the reasons set forth below, I hereby determine that an emergency exists in portions of the Midwest region of the United States due to a shortage of electric energy, a shortage of facilities for the generation of electric energy, and other causes, and that issuance of this Order will meet the emergency and serve the public interest.

Emergency Situation

The Midcontinent Independent System Operator (MISO) faces potential tight reserve margins during the summer 2025 period, particularly during periods of high demand or low generation resource output. The North American Electric Reliability Corporation (NERC) released its 2025 Summer Reliability Assessment on May 14, 2025. In its assessment, NERC indicated that "[d]emand forecasts and resource data indicate that MISO is at elevated risk of operating reserve shortfalls during periods of high demand or low resource output."[1] In particular, the retirement of thermal generation capacity creates the potential for electricity supply shortfalls. NERC anticipates that the near-term period of highest capacity shortfall for MISO will occur in August.[2]

Multiple generation facilities in Michigan have retired in recent years. According to the U.S. Energy Information Administration (EIA), "[s]ince 2020, about 2,700 megawatts of coal-fired generating capacity have been retired and no new coal-fired facilities are planned."[3] Additionally EIA stated, "[t]ypically Michigan's nuclear power plants have supplied about 30% of in-state electricity, but the amount of electricity generated by nuclear power plants in Michigan has declined as plants have been decommissioned."[4] The state's Big Rock Point nuclear power plant shut down in 1997 and the Palisades nuclear power plant closed in 2022. While the Palisades nuclear power plant may reopen in 2025, it will not be available during the peak demand period this summer.

The 1,560 MW J.H. Campbell coal-fired power plant in West Olive, MI, is scheduled to cease operations on May 31, 2025. Its retirement would further decrease available dispatchable generation within MISO's service territory, removing additional such generation along with the other 1,575 MW of natural gas and coal-fired generation that has retired since the summer of 2024. In 2021, Consumers announced that it planned to "speed closure" of Campbell in 2025, several years before the end of its scheduled design life.[5] Although MISO and Consumers have

[1] 2025 summer reliability assessment. (May 14, 2025). https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SRA_2025.pdf
[2] *Id*.
[3] U.S. Energy Information Administration, Michigan State Energy Profile, Oct. 17, 2024, *available at*: https://www.eia.gov/state/print.php?sid=mi.
[4] *Id.*
[5] https://www.consumersenergy.com/news-releases/news-release-details/2021/06/23/consumers-energy-announces-plan-to-end-coal-use-by-2025-lead-michigans-clean-energy-transformation

incorporated the planned retirement into their supply forecasts and acquired a 1,200 MW natural gas power plant in Covert, MI, the NERC Assessment still anticipates "elevated risk of operating reserve shortfalls."

MISO's Planning Resource Auction Results for Planning Year 2025-26, released in April 2025, note that for the northern and central zones, which includes Michigan, "new capacity additions were insufficient to offset the negative impacts of decreased accreditation, suspensions/retirements and external resources." While the results "demonstrated sufficient capacity," the summer months reflected the "highest risk and a tighter supply-demand balance" and the results "reinforce the need to increase capacity."[6]

ORDER

Given the determination that an emergency exists as discussed above, the responsibility of MISO to ensure reliability of its system, and the ability of MISO to identify and dispatch generation necessary to meet load requirements, I have determined that, under the conditions specified below, additional dispatch of the Campbell Plant is necessary to best meet the emergency and serve the public interest for purposes of FPA section 202(c). This determination is based on the insufficiency of dispatchable capacity and anticipated demand during the summer months, and the potential loss of power to homes and local businesses in the areas that may be affected by curtailments or outages, presenting a risk to public health and safety.

This Order is limited in duration to align with the emergency circumstances. Because the additional generation may result in a conflict with environmental standards and requirements, I am authorizing only the necessary additional generation on the conditions contained in this Order, with reporting requirements as described below.

FPA section 202(c) requires the Secretary of Energy to ensure that any 202(c) order that may result in a conflict with a requirement of any environmental law be limited to the "hours necessary to meet the emergency and serve the public interest, and, to the maximum extent practicable," be consistent with any applicable environmental law and minimize any adverse environmental impacts.

Based on my determination of an emergency set forth above, I hereby order:

A. From the time this Order is issued on May 23, 2025, MISO and Consumers Energy shall take all measures necessary to ensure that the Campbell Plant is available to operate. For the duration of this order, MISO is directed to take every step to employ economic dispatch of the Campbell Plant to minimize cost to ratepayers. Following conclusion of this Order, sufficient time for orderly ramp down is permitted, consistent with industry practices. Consumers Energy is directed to comply with all orders from MISO related to the availability and dispatch of the Campbell Plant.

[6] https://cdn misoenergy.org/2025%20PRA%20Results%20Posting%2020250428694160.pdf

B. To minimize adverse environmental impacts, this Order limits operation of dispatched units through the expiration of the Order. MISO shall provide a daily notification to the Department (via AskCR@hq.doe.gov) reporting whether the Campbell Plant has operated in compliance with the allowances contained in this Order.

C. All operation of the Campbell Plant must comply with applicable environmental requirements, including but not limited to monitoring, reporting, and recordkeeping requirements, to the maximum extent feasible while operating consistent with the emergency conditions. This Order does not provide relief from any obligation to pay fees or purchase offsets or allowances for emissions that occur during the emergency condition or to use other geographic or temporal flexibilities available to generators.

D. By June 15, 2025, MISO is directed to provide the Department of Energy (via AskCR@hq.doe.gov) with information concerning the measures it has taken and is planning to take to ensure the operational availability and economic dispatch of the Campbell Plant consistent with the public interest. MISO shall also provide such additional information regarding the environmental impacts of this Order and its compliance with the conditions of this Order, in each case as requested by the Department of Energy from time to time.

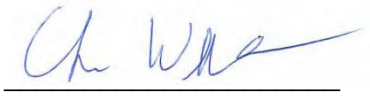
E. The extent to which MISO's current Tariff provisions are inapposite to effectuate the dispatch and operation of the units for the reasons specified herein, the relevant governmental authorities are directed to take such action and make accommodations as may be necessary to do so.

F. Consumers is directed to file with the Federal Energy Regulatory Commission Tariff revisions or waivers necessary to effectuate this order. Rate recovery is available pursuant to 16 U.S.C. § 824a(c).

G. This Order shall not preclude the need for the Campbell Plant to comply with applicable state, local, or Federal law or regulations following the expiration of this Order.

H. This Order shall be effective upon its issuance, and shall expire at 00:00 EDT on August 21, 2025, with the exception of the reporting requirements in paragraph D and applicable compliance obligations in paragraph E.

I. Issued in Washington, D.C. at 3:15:pm Eastern Daylight Time on this 23rd day of May 2025.



Chris Wright
Secretary of Energy

cc: **FERC Commissioners**
Chairman Mark Christie
Commissioner David Rosner
Commissioner Lindsay S. See
Commissioner Judy W. Chang

Michigan Public Service Commissioners
Chairman Dan Cripps
Commissioner Katherine Peretick
Commissioner Alessandra Carreon

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 151
August Campbell Order

Order No. 202-25-7

Pursuant to the authority vested in the Secretary of Energy by section 202(c) of the Federal Power Act (FPA), 16 U.S.C. § 824a(c), and section 301(b) of the Department of Energy Organization Act, 42 U.S.C. §7151(b), and for the reasons set forth below, I hereby determine that an emergency exists in portions of the Midwest region of the United States due to a shortage of electric energy, a shortage of facilities for the generation of electricity, and other causes. Issuance of this Order will meet the emergency and serve the public interest.

Order No. 202-25-3

J.H. Campbell Generating Plant (Campbell Plant) is a 1,420 MW coal-fired plant primarily owned by Consumers Energy Company (Consumers) and located in West Olive, MI. In 2021, Consumers announced that it planned to implement a "speed closure" of the Campbell Plant fifteen years before the end of its scheduled design life.[1] Instead of retiring the Campbell Plant at the end of its design life, Consumers planned to accelerate the Campbell Plant's retirement and discontinue its operations on May 31, 2025.

Order No. 202-25-3, issued pursuant to FPA section 202(c), required that the Campbell Plant remain in operation for 90 days, until August 21, 2025. That order was based on my determination that emergency conditions existed in the region served by the Midcontinent Independent System Operator, Inc. (MISO). Specifically, I determined that MISO likely faced tight reserve margins during the summer 2025 period, particularly during periods of high demand or low generation resource output. I determined that the continued operation of the Campbell Plant would provide additional generation capacity during these periods which would help prevent the potential loss of power to homes and local businesses in the areas that might have been affected by curtailments or outages that would otherwise pose a risk to public health and safety. I determined that the continued operation of the Campbell Plant was necessary to alleviate immediate and anticipated threats to reliability. My determination was based on a number of facts.

First, the North American Electric Reliability Corporation (NERC) released its 2025 Summer Reliability Assessment on May 14, 2025. In its assessment, NERC indicated that "[d]emand forecasts and resource data indicate that MISO is at elevated risk of operating reserve shortfalls during periods of high demand or low resource output."[2] In particular, NERC explained that the retirement of thermal generation capacity increased the likelihood of electricity supply

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[1] *See Consumers Energy Announces Plan to End Coal Use by 2025; Lead Michigan's Clean Energy Transformation*, Consumers Energy (June 23, 2021), https://www.consumersenergy.com/news-releases/news-release-details/2021/06/23/consumers-energy-announces-plan-to-end-coal-use-by-2025-lead-michigans-clean-energy-transformation. As a coal-fired facility, it would be difficult for the Campbell Plant to resume operations once it has been retired. Specifically, any stop and start of operation creates heating and cooling cycles that could cause an immediate failure that could take 30-60 days to repair if a unit comes offline.

[2] *2025 Summer Reliability Assessment*, North American Electric Reliability Corporation, at 16 (May 2025), https://www nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SRA_2025.pdf (NERC 2025 Summer Reliability Assessment).

shortfalls. NERC anticipated that the near-term period of greatest capacity shortfall for MISO would likely occur in August.[3]

Second, multiple generation facilities in Michigan have retired in recent years. According to the U.S. Energy Information Administration (EIA), "[s]ince 2020, about 2,700 megawatts of coal-fired generating capacity have been retired and no new coal-fired facilities are planned."[4] Additionally, EIA stated, "[t]ypically, Michigan's nuclear power plants have supplied about 30% of in-state electricity, but the amount of electricity generated by nuclear power plants in Michigan has declined as plants have been decommissioned."[5] The state's Big Rock Point nuclear power plant shut down in 1997, and the Palisades nuclear power plant closed in 2022. While the Palisades nuclear power plant may reopen in 2025, it was not projected to be available during the peak demand period this summer.[6]

Third, the Campbell Plant's retirement would have further decreased available dispatchable generation within MISO's service territory, adding to the loss of the other 1,575 MW of natural gas and coal-fired generation that has retired since the summer of 2024. Although MISO and Consumers have incorporated the planned retirement of the Campbell Plant into their supply forecasts and Consumers acquired a 1,200 MW natural gas power plant in Covert, MI, the NERC Assessment still anticipates "elevated risk of operating reserve shortfalls."[7]

Fourth, MISO's Planning Resource Auction Results for the 2025-2026 Planning Year, released in April 2025, noted that for the northern and central zones, which includes Michigan, "new capacity additions were insufficient to offset the negative impacts of decreased accreditation, suspensions/retirements and external resources."[8] While the results "demonstrated sufficient capacity," the summer months reflected the "highest risk and a tighter supply-demand balance" and these results "reinforce the need to increase capacity."[9]

Continuing Emergency Conditions

The emergency conditions that led to the issuance of Order No. 202-25-3 continue, both in the near and long term. The summer season has not yet ended, and the production of electricity from the Campbell Plant will continue to be a critical asset to maintain reliability in MISO this summer. That need is evidenced by the fact that the Campbell Plant was called on by MISO to generate large amounts of electricity during the heat wave that hit MISO this past June. According

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[3] *Id.*
[4] *Michigan State Profile and Energy Estimates*, U.S. Energy Info. Admin. (Oct. 17, 2024), https://www.eia.gov/state/print.php?sid=MI.
[5] *Id.*
[6] The start-up of Palisades is scheduled for the fourth quarter of 2025.
[7] NERC 2025 Summer Reliability Assessment at 16.
[8] *Planning Resource Auction—Results for Planning Year 2025–2026,* Midcontinent Independent System Operator, Inc., 13 (May 29, 2025), https://cdn.misoenergy.org/2025%20PRA%20Results%20Posting%2020250529_Corrections694160.pdf. (MISO Planning Resource Auction – Results for Planning Year 2025-26).
[9] *Id*. at 2,12.

to the U.S. Environmental Protection Agency's data, over the month of June, the Campbell Plant generated approximately 664,000 MWh, running at 61% capacity.[10] In fact, between June 11 and August 18, MISO issued dozens of alerts to manage grid reliability in its Central Region in response to hot weather, severe weather, high customer load, forced generation outages, and transfer capability limits. MISO issued alerts for the Central Region on at least 40 of the 69 days between June 11 and August 18. In June, MISO issued alerts affecting the Central Region on 18 days, including an Energy Emergency Alert (EEA) level 1 ("Max Gen Step 1b") on June 23 to enable MISO to take emergency action to ensure grid stability, including bringing additional resources online.[11] The Central Region had alerts on 21 days in July, including one Max Generation Warning on July 29 and two Max Generation Alerts on July 28 and 29.[12] Two Capacity Advisory Initiate alerts have been issued in August to date.[13] Moreover, the May 2025 NERC Summer Reliability Assessment referenced a Seasonal Outlook issued by the National Oceanic and Atmospheric Administration (NOAA), which estimates that much of the Midwest has a 33%-40% chance to experience above-normal temperatures this summer.[14] The Seasonal Outlook released by NOAA on July 17, 2025, increased this estimate for much of the region to a 40%-50% chance.[15]

MISO's resource adequacy problems are not limited to the summer. In 2022, MISO requested Federal Energy Regulatory Commission (FERC) approval of its filing to revise its resource adequacy construct (including the Planning Resource Auction or PRA) to establish capacity requirements for each of the four seasons of the year rather than on an annual basis determined by peak summer demand.[16] MISO justified this revision by explaining that "Reliability risks associated with resource adequacy have shifted from 'Summer only' to a year-round

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[10] *See, Custom Data Download, EPA CAMPD (Clean Air Markets Program Data), https://campd.epa.gov/data/custom-data-download (search criteria to produce these results could include Emissions >> Monthly >> Unit (default) >>Apply >>"2025" and "June." The data can then be filtered to only include the Campbell Plant.)*

[11] An Energy Emergency Alert is an alert declared by the Transmission Provider in accordance with the NERC Operating Manual associated with the Transmission Provider's inability to provide for the Energy and Operating Reserve requirements of the MISO Balancing Authority Area. For more information, see MISO, FERC Electric Tariff, Module A, § 1.E (Definitions) (92.0.0). For more information on Energy Emergency Alert levels, see North American Electric Reliability Corporation. (n.d.). *EOP-011-1 Emergency Operations*. https://www nerc.com/pa/stand/reliability%20standards/eop-011-1.pdf.

[12] A Max Gen Alert occurs when MISO is forecasting a potential capacity shortage. A Max Gen Warning is a warning to prepare for a possible Max Gen Event. *See* MISO Operating Procedures, https://efis.psc.mo.gov/Document/Display/9379 (20180920).

[13] A Capacity Advisory alert is an advisory issued based on the potential for limited operating capacity margins (<5%) in the following 2-3 days. *See* MISO Operating Procedures, https://efis.psc.mo.gov/Document/Display/9379 (20180920).

[14] NERC 2025 Summer Assessment at 9.

[15] *Seasonal Outlook*, NOAA Climate Prediction Ctr., (July 17, 2025), https://www.cpc.ncep noaa.gov/products/predictions/long_range/seasonal.php?lead=1.

[16] M*idcontinent Independent System Operator, Inc.,* FERC Docket No. ER22-495-000 (Nov. 30, 2021). This request was approved by FERC on August 31, 2022. Midcontinent Independent System Operator, Inc.*,* 180 FERC ¶ 61,141 (2022).

concern."[17] MISO noted that over 60 percent of all "MaxGen" events (events when MISO initiates emergency procedures because of concerns over the adequacy of available generation) occurred outside of the summer season.[18]

In December of 2023, MISO released an "Attributes Roadmap," in which it presented "an in-depth look at the challenges of operating a reliable bulk electric system in a rapidly transforming energy landscape."[19] Among other things, this report described changes in the time of year during which the risk of the loss of load was greatest. For the 2023/24 Planning Year, the greatest risk of loss of load was in the summer, but it is expected that by the summer of 2027, there will be an equal loss of load risk in both the summer and fall seasons. MISO also projects that the risk of loss of load in the winter and spring seasons, although not as high as in the summer or fall, will nevertheless increase over time.[20]

More recently, MISO affirmed the resource adequacy problems occurring outside of its summer season in its 2024 report entitled, "*MISO's Response to the Reliability Imperative."*[21] In a section of that report entitled "Risks in Non-Summer Seasons," MISO again stressed that it has resource reliability concerns outside of the summer season.

> Widespread retirements of dispatchable resources, lower reserve margins, more frequent and severe weather events and increased reliance on weather-dependent renewables and emergency-only resources have altered the region's highest historic risk profile, creating risks in non-summer months that rarely posed challenges in the past.[22]

These MISO studies indicate that the emergency conditions caused by the loss of generation capacity in MISO extend past the summer season.

The evidence indicates that there is also a potential longer term resource adequacy emergency in MISO. When MISO reported the results of its PRA for the 2025-26 Planning Year, it noted that "new capacity additions were insufficient to offset the negative impacts of decreased accreditation, suspensions/retirements and external resources" in the northern and central zones, which include Michigan.[23]

On June 6, 2025, subsequent to the issuance of Order No. 202-25-3, the Organization of MISO States (OMS) and MISO issued the results of their survey, which has been conducted annually for many years to determine the degree to which expected capacity resources satisfy

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[17] MISO Transmittal Letter at 3, FERC Docket No. ER22-495-000 (Nov. 30, 2021).
[18] *Id.* at 3-4.
[19] *Attributes Roadmap*, MISO (Dec. 2023), https://cdn misoenergy.org/2023%20Attributes%20Roadmap631174.pdf.
[20] *Id.* at 11.
[21] *MISO's Response to the Reliability Imperative*, MISO (Updated Feb. 2024), https://cdn.misoenergy.org/2024+Reliability+Imperative+report+Feb.+21+Final504018.pdf.
[22] *Id.* at 12.
[23] MISO Planning Resource Auction – Results for Planning Year 2025-26 at 13.

planning reserve margin requirements.[24] The 2025 Survey presented projections of resource adequacy for the summer of 2026 and subsequent years. Although the survey projected a potential capacity surplus for the summer of 2026, it also projected that at least 3.1 GW of additional generation capacity beyond currently committed generation capacity must be added to meet the projected planning reserve margin.[25] The survey also projected that there would be insufficient capacity to meet the peak demand for electricity in each of the following four summers, increasing from a deficit of 1.4 GW in 2027 to 8.2 GW in 2030.[26] Similar results were projected for MISO's winter seasons, with a small surplus of generation capacity in 2026, followed by increasing deficits the following four years.[27]

The primary reasons for these projected deficits also are shown on the OMS-MISO survey. Large amounts of existing generation capacity are projected to be retired each year while, at the same time, the demand for electricity is projected to increase at an accelerating pace.[28] Although the OMS-MISO survey projects generation capacity to continue to increase in the coming years with the addition of new potential generation assets, the increase in capacity is largely offset by the projected retirements, and does not keep up with the growth in demand.[29]

MISO has been taking steps to address these projected deficits. For example, on June 6, 2025, MISO submitted a proposal to FERC to establish an Expedited Resource Addition Study (ERAS) process to provide a framework for the expedited study of interconnection requests to address urgent resource adequacy and reliability needs in the near term. This proposal was approved by FERC on July 21, 2025.[30] The ERAS process should help expedite the construction of needed new capacity. However, resources studied under the ERAS will have commercial operation dates that are at least three years away, and are provided an additional three year grace period to commence commercial operations.[31] In addition, supply chain constraints impeding the acquisition of critical grid components, including large natural gas turbines and transformers, are likely to further hinder rapid construction and exacerbate reliability concerns.[32] Consequently, the new ERAS process is unlikely to result in the addition of any new generation capacity in the next few years.

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[24] *2025 OMS-MISO Survey Results*, OMS and MISO (Updated June 6, 2025) https://cdn.misoenergy.org/20250606%20OMS%20MISO%20Survey%20Results%20Workshop%20Presentation702311.pdf.
[25] *Id.* at 2.
[26] *Id.* at 7.
[27] *Id.* at 9.
[28] *Id.* at 7, 9.
[29] *Id.*
[30] M*idcontinent Independent System Operator, Inc.,* 192 FERC ¶ 61,064 (2025).
[31] 192 FERC ¶ 61,064 at P 84.
[32] *See generally*, *US Gas-Fired Turbine Wait Times as Much as Seven Years; Costs Up Sharply*, S&P Global (May 2025), US gas-fired turbine wait times as much as seven years; costs up sharply | S&P Global. "With demand for natural gas-fired turbines in the US rapidly accelerating amid power demand growth forecasts driven by AI, manufacturing, and electrification, wait times for turbines are anywhere between one and seven years depending on the model, and costs have increased considerably, experts told Platts."

Order 202-25-3 was preceded by executive orders on January 20, 2025, and April 8, 2025, in which President Donald J. Trump underscored the dire energy challenges facing the Nation due to growing resource adequacy concerns. Specifically, in Executive Order 14262, "Strengthening the Reliability and Security of the United States Electric Grid," President Trump emphasized that "the United States is experiencing an unprecedented surge in electricity demand driven by rapid technological advancements, including the expansion of artificial intelligence data centers and increase in domestic manufacturing."[33] President Trump likewise recognized, in Executive Order 14156, "Declaring a National Energy Emergency," that the "United States' insufficient energy production, transportation, refining, and generation constitutes an unusual and extraordinary threat to our Nation's economy, national security, and foreign policy."[34] The Executive Order adds: "Hostile state and non-state foreign actors have targeted our domestic energy infrastructure, weaponized our reliance on foreign energy, and abused their ability to cause dramatic swings within international commodity markets."[35]

The Department's July 2025 Resource Adequacy Report: Evaluating the Reliability and Security of the United States Electric Grid, issued pursuant to the President's directive in Executive Order 14262, details the myriad challenges affecting the Nation's energy outlook. "Absent decisive intervention, the Nation's power grid will be unable to meet projected demand for manufacturing, re-industrialization, and data centers driving artificial intelligence (AI) innovation."[36] The prolific growth of data centers for the development of AI, as well as their immense energy needs, presents a new and unexpected source of load growth. This growth is illustrated by the fact that there are more than twenty AI companies operating in Michigan alone.[37] In addition, as just one example, Consumers has announced an additional 1 GW of new power to a planned hyperscale data center and "continue[s] to see positive momentum with data centers within the 9 GW pipeline . . . ."[38]

Grid operators—including MISO itself—have likewise acknowledged the Nation's current energy crisis. For instance, during a March 25, 2025, hearing before the House Committee on Energy and Commerce, Jennifer Curran, Senior Vice President, Planning and Operations, MISO, testified that "the MISO region faces resource adequacy and reliability challenges due to the

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[33] Executive Order No. 14262, 90 Fed. Reg. 15521 (Apr. 8, 2025) (*Strengthening the Reliability and Security of the United States Electric Grid*), https://www.whitehouse.gov/presidential-actions/2025/04/strengthening-the-reliability-and-security-of-the-united-states-electric-grid/.

[34] Executive Order No. 14156, 90 Fed. Reg. 8433 (Jan. 20, 2025) (*Declaring a National Energy Emergency*), https://www.whitehouse.gov/presidential-actions/2025/01/declaring-a-national-energy-emergency/.

[35] *Id*.

[36] *See also Resource Adequacy Report: Evaluating the Reliability and Security of the United States Electric Grid*, U.S. Department of Energy (July 2025), at 1, https://www.energy.gov/sites/default/files/2025-07/DOE%20Final%20EO%20Report%20%28FINAL%20JULY%207%29.pdf.

[37] Ekku Jokinen, *Top 21 Artificial Intelligence Companies in Michigan*, (last accessed Aug. 13, 2025), https://www.inven.ai/company-lists/top-21-artificial-intelligence-companies-in-michigan.

[38] *See Michigan utility Consumers Energy to provide 1GW of power to new hyperscale data center*, Data Center Dynamics (August 05, 2025), https://www.datacenterdynamics.com/en/news/michigan-utility-consumers-energy-to-provide-1gw-of-power-to-new-hyperscale-data-center/ (quoting Consumers Energy CEO Garrick Rochow).

changing characteristics of the electric generating fleet, inadequate transmission system infrastructure, growing pressures from extreme weather, and rapid load growth."[39] Ms. Curran also described "much stronger growth [in demand for electricity] from continued electrification efforts, a resurgence in manufacturing, and an unexpected demand for energy-hungry data centers to support artificial intelligence."[40] She added, "[a] growing reliability risk is that the rapid retirement of existing coal and gas power plants threatens to outpace the ability of new resources with the necessary operational characteristics to replace them."[41]

ORDER

FPA section 202(c)(1) provides that whenever the Secretary of the Department of Energy determines "that an emergency exists by reason of a sudden increase in the demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy," then the Secretary has the authority "to require by order . . . such generation, delivery, interchange, or transmission of electric energy as in its judgment will best meet the emergency and serve the public interest."[42] This statutory language constitutes a specific grant of authority to the Secretary to require the continued operation of the Campbell Plant when the Secretary has determined that such continued operation will best meet an emergency caused by a sudden increase in the demand for electric energy or a shortage of generation capacity.

Such is the case here. As described above, the emergency conditions resulting from increasing demand and accelerated retirements of generation facilities supporting the issuance of Order No. 202-25-3 will continue in the near term and are also likely to continue in subsequent years. This could lead to the potential loss of power to homes and local businesses in the areas that may be affected by curtailments or outages, presenting a risk to public health and safety. Given the responsibility of MISO to identify and dispatch generation necessary to meet load requirements, I have determined that, under the conditions specified below, continued additional dispatch of the Campbell Plant is necessary to best meet the emergency and serve the public interest under FPA section 202(c).

To ensure the Campbell Plant will be available if needed to address emergency conditions, the Campbell Plant shall remain in operation until November 19, 2025.[43]

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[39] Keeping the Lights On: Examining the State of Regional Grid Reliability Before the House Committee on Energy and Commerce, Subcommittee on Energy, 119th Cong. (Mar. 25, 2025) (statement of Ms. Jennifer Curran, Senior Vice President for Planning and Operations, Midcontinent Independent System Operator), at 5, https://democrats-energycommerce house.gov/sites/evo-subsites/democrats-energycommerce house.gov/files/evo-media-document/witness-testimony_curran_eng_grid-operators_03.25.2025.pdf.

[40] *Id.* at 6.

[41] *Id.* at 7.

[42] Although the text of FPA section 202(c) grants this authority to "the Commission," section 301(b) of the Department of Energy Organization Act transferred this authority to the Secretary of the Department of Energy. *See* 42 U.S.C. § 7151(b) (2018).

[43] 16 U.S.C. § 824a(c)(4).

Based on my determination of an emergency set forth above, I hereby order:

A. From August 21, 2025, MISO and Consumer Energy shall take all measures necessary to ensure that the Campbell Plant is available to operate. For the duration of this Order, MISO is directed to take every step to employ economic dispatch of the Campbell Plant to minimize cost to ratepayers. Following the conclusion of this Order, sufficient time for orderly ramp down is permitted, consistent with industry practices. Consumers Energy is directed to comply with all orders from MISO related to the availability and dispatch of the Campbell Plant.

B. To minimize adverse environmental impacts, this Order limits operation of dispatched units to the times and within the parameters as determined by MISO pursuant to paragraph A. MISO shall provide a daily notification to the Department (via AskCR@hq.doe.gov) reporting whether the Campbell Plant has operated in compliance with the allowances contained in this Order.

C. All operation of the Campbell Plant must comply with applicable environmental requirements, including but not limited to monitoring, reporting, and recordkeeping requirements, to the maximum extent feasible while operating consistent with the emergency conditions. This Order does not provide relief from any obligation to pay fees or purchase offsets or allowances for emissions that occur during the emergency condition or to use other geographic or temporal flexibilities available to generators.

D. By September 4, 2025, MISO is directed to provide the Department of Energy (via AskCR@hq.doe.gov) with information concerning the measures it has taken and is planning to take to ensure the operational availability of the Campbell Plant consistent with this Order. MISO shall also provide such additional information regarding the environmental impacts of this Order and its compliance with the conditions of this Order, in each case as requested by the Department of Energy from time to time.

E. Consumers is directed to file with the Federal Energy Regulatory Commission Tariff revisions or waivers to effectuate this Order. Rate recovery is available pursuant to 16 U.S.C. § 824a(c).

F. This Order shall not preclude the need for the Campbell Plant to comply with applicable state, local, or Federal law or regulations following the expiration of this Order.

G. Because this Order is predicated on the shortage of facilities for generation of electric energy and other causes, the Campbell Plant shall not be considered a capacity resource.

H. This Order shall be effective from 00:00 Eastern Daylight Time (EDT) on August 21, 2025, and shall expire at 00:00 EDT on November 19, 2025, with the exception of applicable compliance obligations in paragraph D.

I. Issued in Norfolk, Virginia at 8:50pm Eastern Daylight Time on this 20th day of August 2025.

Chris Wright
Secretary of Energy

cc: **FERC Commissioners**
Chairman David Rosner
Commissioner Lindsay S. See
Commissioner Judy W. Chang

Michigan Public Service Commissioners
Chairman Dan Scripps
Commissioner Katherine Peretick
Commissioner Shaquila Myers

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 152
CenterPoint Rate Case Discovery Responses

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF SOUTHERN INDIANA GAS AND ELECTRIC COMPANY D/B/A CENTERPOINT ENERGY INDIANA SOUTH ("CEI SOUTH") FOR (1) AUTHORITY TO MODIFY ITS RATES AND CHARGES FOR ELECTRIC UTILITY SERVICE THROUGH A PHASE-IN OF RATES, (2) APPROVAL OF NEW SCHEDULES OF RATES AND CHARGES, AND NEW AND REVISED RIDERS, INCLUDING BUT NOT LIMITED TO A NEW TAX ADJUSTMENT RIDER AND A NEW GREEN POWER RIDER (3) APPROVAL OF A CRITICAL PEAK PRICING ("CPP") PILOT PROGRAM, (4) APPROVAL OF REVISED DEPRECIATION RATES APPLICABLE TO ELECTRIC AND COMMON PLANT IN SERVICE, (5) APPROVAL OF NECESSARY AND APPROPRIATE ACCOUNTING RELIEF, INCLUDING AUTHORITY TO CAPITALIZE AS RATE BASE ALL CLOUD COMPUTING COSTS AND DEFER TO A REGULATORY ASSET AMOUNTS NOT ALREADY INCLUDED IN BASE RATES THAT ARE INCURRED FOR THIRD-PARTY CLOUD COMPUTING ARRANGEMENTS, AND (6) APPROVAL OF AN ALTERNATIVE REGULATORY PLAN GRANTING CEI SOUTH A WAIVER FROM 170 IAC 4-1-16(f) TO ALLOW FOR REMOTE DISCONNECTION FOR NON-PAYMENT.	**CAUSE NO. 45990**

CENTERPOINT ENERGY INDIANA SOUTH'S RESPONSE TO OUCC'S TWENTY-SIXTH SET OF DATA REQUESTS

Southern Indiana Gas & Electric Company d/b/a CenterPoint Energy Indiana South ("CEI South") pursuant to 170 IAC 1-1.1-16 and the discovery provisions of Rules 26 through 37 of the Indiana Rules of Trial Procedure, by its counsel, hereby submits the following Objections and Responses to the OUCC's Twenty-Sixth Set of Data Requests dated February 1, 2024 ("Requests").

General Objections

All of the following General Objections are incorporated by reference in the response to each of the Requests:

1. The responses provided to the Requests have been prepared pursuant to a reasonable and diligent investigation and search conducted in connection with the Requests in those areas where information is expected to be found. To the extent the Requests purport to require more than a reasonable and diligent investigation and search, CEI South objects on grounds that they include an undue burden or unreasonable expense.

2. CEI South objects to the Requests to the extent they seek documents or information which are not relevant to the subject matter of this proceeding and which are not reasonably calculated to lead to the discovery of admissible evidence.

3. CEI South objects to the Requests to the extent they seek responses and information from individuals and entities who are not parties to this proceeding and to the extent they request the production of information and documents not presently in CEI South's possession, custody or control. CEI South further objects to the Requests to the extent they are (i) vague and ambiguous as to the individuals and entities to whom the Request refer, or (ii) overbroad and not reasonably calculated to lead to the discovery of relevant or admissible evidence.

4. CEI South objects to the Requests to the extent they seek an analysis, calculation, or compilation which has not already been performed and which CEI South objects to performing.

5. CEI South objects to the Requests to the extent they are vague and ambiguous and provide no basis from which CEI South can determine what information is sought.

6. CEI South objects to the Requests to the extent they seek information outside the scope of this proceeding, and as such, the Requests seek information not reasonably calculated to lead to the discovery of relevant or admissible evidence.

7. CEI South objects to the extent the Requests purport to require production of (a) information in a particular format; (b) multiple copies of the same document; (c) additional copies of the same document merely because alterations, notes, comments, or other material appear thereon when such other material is not material or relevant; and (d) copies of the same information in multiple formats on the grounds that it is irrelevant, overbroad, unreasonably burdensome and not required by the Commission rules and inconsistent with practice in Commission proceedings.

8. CEI South objects to the Requests to the extent they solicit copies of voluminous documents.

9. CEI South objects to the Requests to the extent the discovery sought is unreasonably cumulative or duplicative; or is obtainable from some other source that is more convenient, less burdensome, or less expensive.

10. CEI South objects to the Requests to the extent the burden or expense of the proposed discovery outweighs its likely benefit, taking into account the needs of the case, the amount in controversy, the parties' resources, the importance of the issues at stake in litigation, and the importance of the proposed discovery in resolving the issues.

11. CEI South objects to the Request on the grounds that it is overbroad, unreasonably burdensome and seeks information that is largely irrelevant to the subject matter of this proceeding.

12. CEI South objects to the Requests to the extent they seek information that is confidential, proprietary, competitively sensitive and/or trade secret.

13. The responses constitute the corporate responses of CEI South and contain information gathered from a variety of sources. CEI South objects to the Requests to the extent they request identification of and personal information about all persons who participated in responding to each data request on the grounds that it is overbroad, unreasonably burdensome and irrelevant given the nature

and scope of the requests and the many people who may be consulted about them. CEI South further objects to the Requests to the extent they purport to require identification of a witness who can answer questions regarding the substance of or origination of information supplied in each response on the ground that CEI South has no obligation to call witnesses to testify as to information provided in discovery.

14. CEI South objects to the Requests to the extent they seek information that is subject to the attorney-client, work product, settlement negotiation or other applicable privileges. CEI South further objects to the Requests to the extent they purport to require the creation of a privilege log on the grounds that given the extremely expedited and informal nature of discovery in this proceeding, contemporaneous privilege logs are inappropriate. CEI South objects to the Requests on the grounds they are unreasonably burdensome, overbroad, inconsistent with discovery practices in Commission proceedings and inconsistent with the informal discovery process applicable to this proceeding.

15. CEI South assumes no obligation to supplement these responses except to the extent required by Ind. Tr. R. 26(E) (1) and (2) and objects to the extent the instructions and/or Requests purport to impose any greater obligation. CEI South denies that Ind. Tr. R. 26(E)(3) applies to the Requests.

Subject to and without waiver of the general and specific objections set forth herein, CEI South responds to the Requests in the manner set forth below.

Data Requests – Set 26

Q 26.1: According to Attachment CMB-1, CEI South (Gas & Electric) had a $779,891,000 long-term debt payable to Vectren Utility Holdings ("VUH") as of 12/31/2022. Petitioner's Exhibit No. 20, Schedule D-2 reflects a zero balance VUH long-term debt (line 38 of Excel file) as of 12/31/2025.

a) Does this indicate Petitioner's intention to refinance the VUH long-term debt with third party long-term debt? If no, please explain why VUH long-term debt is zero as of 12/31/2025.

b) When does Petitioner expect to refinance or otherwise eliminate the VUH long-term debt?

c) Has this elimination (or refinancing) of VUH long-term debt occurred as of 12/31/2023? Please explain.

Response:

a) Yes. As Petitioner issues new third-party long-term debt, it is repaying borrowings from its parent company.

b) Petitioner expects to refinance the VUH long-term debt by the end of 2025.

c) $255,587,000 of VUH long-term debt remains outstanding as of 12/31/2023.

Q 26.2: According to Attachment SEG-3, the Statement of Cash Flows for CEI South (Gas & Electric), there are no cash outflows reflected for intercompany long-term debt in either 2024 or 2025. Does this indicate Petitioner's intention to refinance or otherwise eliminate VUH long-term debt in 2023? Please explain.

Response: As stated in CEI South's Response to OUCC DR 26.1.b (above), CEI South (Gas & Electric) plans to pay down the full balance of VUH long-term intercompany debt in 2025. Please see the attachments listed below. The Company will file corrections to Petitioner's Exhibit No. 3, Attachment SEG-2 & Attachment SEG-3 to show the cash outflow in 2025 to reflect the full paydown of the intercompany long-term debt.

Attachment:

- 45990 OUCC DR26 26.2_Corrected Pet. Ex. No. 3, Att. SEG-2.xlsx
- 45990 OUCC DR26 26.2_Corrected Pet. Ex. No. 3, Att. SEG-3.xlsx

Q 26.3: Is the VUH long-term debt interest bearing? If yes, what is the interest rate or rates on this debt? If no, please explain why not.

Response: Yes, the VUH long-term debt is interest bearing. Of the $255,587,000 VUHI long-term debt outstanding as of 12/31/2023, $75,000,000 has an effective rate of 1.72%; $106,000,000 has an effective rate of 1.21%; and $74,587,000 has an effective rate of 3.315031%.

Q 26.4: Please state the total operating expenses to operate Culley Unit 2 for each of the calendar years 2020, 2021, 2022, and 2023. This information should be provided by FERC Account for each year in Excel format with formulas intact and cells unlocked.

Response: Please refer to the attachment listed below. Note that due to differences in the way data is stored and presented in Oracle versus SAP, the data for periods prior to July 2021 may not be directly comparable to data for periods after July 2021.

Attachment:

- 45990 OUCC DR26 26.4_FBC2 Operating Expense.xlsx[1]

[1] Information for 2023 is limited to January through September since October through December books have not yet been closed. Information for October through December 2023 can be provided upon request after books have closed.

Q 26.5: Regarding Schedule C-3.33, does the $2,865,574 of operating expenses represent the operating costs for Culley Unit 2 as forecasted for the future test year (2025)? If no, please identify the time period these operating expenses pertain to.

Response: No; the $2,865,574 of operating expenses on Schedule C-3.33 represents the forecasted costs associated with Culley Unit 2 that will be eliminated upon its retirement. Note that the retirement of Culley Unit 2 does not fully eliminate the common expenses that have been allocated to Culley Unit 2 prior to its retirement. The $2,865,574 operating expense includes $2,270,673 for Culley Unit 2 direct cost and $594,901 Culley Unit 2 common costs that are related and allocated to Culley Unit 2 operations.

Q 26.6: Did Petitioner forecast increased operating expenses compared to the base period for its Culley Unit 2 plant through the 12 months ending 12/31/2025? If yes, please state the 2022 operating expenses to operate Culley Unit 2 and the additional costs forecasted for each of the years, 2023, 2024, and 2025 by FERC Account. If no, please explain why no increased operating expenses were forecasted for Culley Unit 2.

Response: No, CEI South did not forecast increased operating expenses to operate Culley Unit 2 compared to the base period. During the forecasting process, CEI South did not identify any needs that would drive up the 2025 operating expenses compared to the base period.

Q 26.7: The Internal Revenue Code currently allows taxable entities to deduct certain costs as repair deductions for tax purposes even though these costs were capitalized for book purposes. Does Petitioner deduct repair deductions for Federal Income Tax purposes that were capitalized for book purposes? Please explain. If yes, please state the repair deduction taken for federal income tax purposes associated with or allocated to CEI South Electric for each of the calendar years 2019, 2020, 2021, 2022, and 2023.

Objection: CEI South objects to the Request on the grounds and to the extent the Request seeks information that is trade secret or other proprietary, confidential, and competitively sensitive business information of CEI South, its customers, or third parties. CEI South has made reasonable efforts to maintain the confidentiality of this information. Such information has independent economic value and disclosure of the requested information would cause an identifiable harm to Petitioner, its customers, or third parties. The responses are "trade secret" under law (Ind. Code § 24-2-3-2) and entitled to protection against disclosure. See also Indiana Trial Rule 26(C)(7). All responses containing designated confidential information are being provided pursuant to nondisclosure agreements between Petitioner and the receiving parties.

Response: Subject to and without waiving the foregoing objection, CEI South provides the following response: Yes, the Petitioner deducts repairs and maintenance costs that were capitalized for book purposes on its Federal Income Tax return and provision. Please see below for the repairs and maintenance deduction attributable to CEI South Electric in calendar years 2019, 2020, 2021, 2022 and 2023:

- 12/31/2019: [redacted]
- 12/31/2020: [redacted]
- 12/31/2021: [redacted]
- 12/31/2022: [redacted]
- 12/31/2023: [redacted]

Q 26.8: Regarding the direct testimony of Matthew A. Rice, Pet.'s Ex. No. 19, Attachment MAR-1, page 117-118, please provide calculation support for the following proposed amounts.

a) Reliability costs for the non-fuel related purchase power of $20,583,262.
b) Interruptible Sales billing credit of $725,000
c) Environmental Emission Allowances of $3,519,952.
d) Wholesale power marketing sales of $21,723,254.
e) BAMP Rate Backup generation capacity services revenue of $201,960.

Objection: CEI South objects to the Request on the grounds and to the extent the Request seeks information that is trade secret or other proprietary, confidential, and competitively sensitive business information of CEI South, its customers, or third parties. CEI South has made reasonable efforts to maintain the confidentiality of this information. Such information has independent economic value and disclosure of the requested information would cause an identifiable harm to Petitioner, its customers, or third parties. The responses are "trade secret" under law (Ind. Code § 24-2-3-2) and entitled to protection against disclosure. See also Indiana Trial Rule 26(C)(7). All responses containing designated confidential information are being provided pursuant to nondisclosure agreements between Petitioner and the receiving parties. "HIGHLY CONFIDENTIAL – FOR ATTORNEYS' EYES ONLY" information is provided pursuant to non-disclosure agreements between CEI South and the receiving parties and is solely for the receiving parties' attorneys to review.

Response: Subject to and without waiver of the foregoing objection, CEI South responds as follows:

a) Please see the attachments listed below: $2,026,462 is located on the RCRA 21-PJM Forecast tab in the first attachment; $5,697,000 is included for OVEC Capacity (see the second attachment); and $12,859,800 is included for capacity purchases (see the third attachment).
b) Please see CEI South's Response to 45990 OUCC DR 22.2(c)(I). There is not a calculation to support this amount. There is an estimated [redacted] of available DR, and CEI South received a bid for DR aggregation as a part of its most recent IRP for [redacted] per MW. $725,000 is [redacted].
c) Please see the attachment listed below.
d) Please see the confidential attachment provided in CEI South's Response to SABIC DR03 3.12: 45990 SABIC DR03 Q3.12 (HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY)_WPM.xlsx[2].
e) Please see Schedule E-4.1, Confidential,[3] page 5, line 14 column (G). [redacted] backup kW times 9.8 days of backup times $0.297 CONE per kw per day.

[2] This file contains information designated as "Highly Confidential – Attorneys' Eyes Only" and, pursuant to the Nondisclosure Agreement between CEI South and certain parties to this case must be restricted from any disclosure to anyone outside of attorneys for those parties who have signed the agreement to be bound.
[3] The Confidential Revenue Model Workpaper contains information designated as "Highly Confidential – Attorneys' Eyes Only" and, pursuant to the Nondisclosure Agreement between CEI South and certain parties to this case must be restricted from any disclosure to anyone outside of attorneys for those parties who have signed the agreement to be bound.

Attachments:

- 45990 OUCC DR 26 26.08a_RCRA 21 PJM Forecast through 2028.xlsx
- 45990 OUCC DR26 26.08a (CONFIDENTIAL)_2025 OVEC Demand Projection.xlsx
- 45990 OUCC DR26 26.08a_IE Capacity Forecast 2025.xlsx
- 45990 OUCC DR26 26.08c_NOX Costs 2025.xlsx

Q 26.9: Regarding the direct testimony of Matthew A. Rice, Pet.'s Ex. No. 19, Attachment MAR-1, pages 117-118, please provide a month by month forecasted breakdown of Phase 1 of the following.

a) Reliability costs for the non-fuel related purchase power costs.
b) Interruptible Sales billing credit amount.
c) Environmental Emission Allowances used by retail customers.
d) Wholesale Power Marketing sales amount.
e) Retail portion of the margin from Environmental Emission Allowance sales for the period.
f) BAMP Rate Backup generation capacity services revenue for the period.

Objection: CEI South objects to the Request on the grounds and to the extent the Request seeks information that is trade secret or other proprietary, confidential, and competitively sensitive business information of CEI South, its customers, or third parties. CEI South has made reasonable efforts to maintain the confidentiality of this information. Such information has independent economic value and disclosure of the requested information would cause an identifiable harm to Petitioner, its customers, or third parties. The responses are "trade secret" under law (Ind. Code § 24-2-3-2) and entitled to protection against disclosure. See also Indiana Trial Rule 26(C)(7). All responses containing designated confidential information are being provided pursuant to nondisclosure agreements between Petitioner and the receiving parties.

Response: Subject to and without waiver of the foregoing objection, CEI South responds as follows: Where possible monthly 2025 information is provided in OUCC 26.8 for the test year. CEI South has proposed these base amounts, which will remain the same in Phase 1 through Phase 3.

a) Please see 45990 OUCC DR 26.8a (above).
b) Please see 45990 OUCC DR 26.8b (above).
c) Please see 45990 OUCC DR 26.8c (above).
d) Please see 45990 OUCC DR 26.8d (above).
e) CEI South does not plan to sell any environmental emission allowances in 2025.
f) Please see 45990 OUCC DR 26.8e (above).

Q 26.10: Regarding the direct testimony of Matthew A. Rice, Pet.'s Ex. No. 19, Attachment MAR-1, pages 117-118, please provide a month-by-month forecasted breakdown of Phase 2 of the following.

a) Reliability costs for the non-fuel related purchase power costs.
b) Interruptible Sales billing credit amount.
c) Environmental Emission Allowances used by retail customers.
d) Wholesale Power Marketing sales amount.
e) Retail portion of the margin from Environmental Emission Allowance sales for the period.
f) BAMP Rate Backup generation capacity services revenue for the period.

Response: Please see CEI South's Response to 45990 OUCC 26.9 (above).

Q 26.11: Regarding the Petitioner's Financial Exhibit No. 20, Schedule C3.2, sponsored by witness Chrissy M. Behme, please explain why the increase in TDSIC O&M expense of $27,779 is included in both line 4 and line 7. What purpose is served by this O&M expense adjustment?

Response: The Petitioner's Exhibit No. 20 calculates total revenues for test year 2025, which includes the projected revenue requirement for the TDSIC mechanism. The TDSIC O&M is part of the revenue requirement, and since it is a pass-through cost, it is subsequently removed from the adjustment. It has a net zero impact on net operating income.

Q 26.12: Regarding the Petitioner Financial Exhibit No. 20, Workpaper C3.2a, sponsored by witness Chrissy M. Behme, specifically, the "Large Customer Adjustment – investment" of $1,330,663 and "Large Customer Adjustment – Expense" of $24,507,

a) Please provide how these amounts were calculated.
b) Please provide a schedule support for the periods in which these large customer adjustments are forecasted to take place.
c) Please provide an explanation for how these adjustments are part of the overall TDSIC annualization adjustment.

Objection: CEI South objects to the Request on the grounds and to the extent the Request seeks information that is trade secret or other proprietary, confidential, and competitively sensitive business information of CEI South, its customers, or third parties. CEI South has made reasonable efforts to maintain the confidentiality of this information. Such information has independent economic value and disclosure of the requested information would cause an identifiable harm to Petitioner, its customers, or third parties. The responses are "trade secret" under law (Ind. Code § 24-2-3-2) and entitled to protection against disclosure. See also Indiana Trial Rule 26(C)(7). All responses containing designated confidential information are being provided pursuant to nondisclosure agreements between Petitioner and the receiving parties. "HIGHLY CONFIDENTIAL – FOR ATTORNEYS' EYES ONLY" information is provided pursuant to non-disclosure agreements between CEI South and the receiving parties and is solely for the receiving parties' attorneys to review.

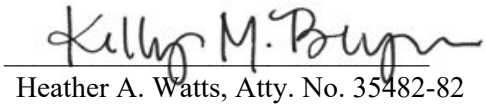
Response: Subject to and without waiver of the foregoing response, CEI South responds as follows:

a) These amounts represent the projected 2025 TDSIC revenues [redacted] based on their expected consumption.
b) Please see Cells P61 and P64 of tab "[redacted]" within 45990_CEI South_Confidential Revenue Model Workpaper.xlsx.[4]
c) The TDSIC related adjustments on Schedule C3.1 and the total adjustment on Schedule C3.2 will net to the total TDSIC annualized adjustment of $1,627,665. The TDSIC only portion of the adjustment on Schedule C3.1 is found on WP-C2.1c lines 25 and 26, column B. This schedule and workpaper can be found within the 45990_CEI South_No 20 Financial Exhibit, as well as within 45990_CEI South_Confidential Revenue Model Workpaper.[5]

[4] The Confidential Revenue Model Workpaper contains information designated as "Highly Confidential – Attorneys' Eyes Only" and, pursuant to the Nondisclosure Agreement between CEI South and certain parties to this case, must be restricted from any disclosure to anyone outside of attorneys for those parties who have signed the agreement to be bound.
[5] See Footnote 4, supra.

Dated: February 12, 2024

As to objections only,



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		Amount	Amount	Amount	Amount
	Company Code	0599	0599	0599	0599
	Fiscal Year	2020	2021	2022	2023 through Sept
FERC Account		$	$	$	$
4081	Other Taxes-Non-Inc	-	27,040.66	67,640.83	40,275.65
4265	Other Deductions	-	-	-	40.30
5000	Oper Supv & Eng	-	223,481.84	358,518.65	202,153.88
5060	Misc Steam Pwr Exps	-	20,316.56	32,592.62	18,377.64
5100	Maint Suprv & Eng	177,466.34	204,990.48	260,740.80	147,020.95
9250	Injuries & Damages	-	441.23	1,408.12	679.59
9260	Empl Pensions&Ben	-	88,674.11	232,965.11	116,417.09
5130	Maint of Elec Plant	-	51,919.64	56,488.74	48,577.90
5120	Maint of Boiler Plt	833,316.39	887,907.28	793,461.69	480,310.53
5020	Steam Exp	733,871.50	484,400.19	228,145.68	122,634.98
5050	Electric Exp	486,956.83	317,563.00	306,087.77	185,586.58
	Total	**2,231,611.06**	**2,306,734.99**	**2,338,050.01**	**1,362,075.09**

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	)))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 153
Wayne Games 2018 Testimony

SOUTHERN INDIANA GAS AND ELECTRIC COMPANY

D/B/A

VECTREN ENERGY DELIVERY OF INDIANA, INC.

CAUSE NO. 45052

PUBLIC REBUTTAL TESTIMONY

OF

WAYNE D. GAMES

VICE PRESIDENT OF POWER SUPPLY

SPONSORING PETITIONER'S EXHIBIT NO. 4-R,
ATTACHMENTS WDG-1R THROUGH WDG-4R

REBUTTAL TESTIMONY

OF

WAYNE D. GAMES

VICE PRESIDENT OF POWER SUPPLY

Q. Please state your name and business address.

A. My name is Wayne D. Games, and my business address is One Vectren Square, Evansville, Indiana 47708.

Q. Did you provide Direct Testimony on behalf of Vectren South in this Cause?

A. Yes.

Q. Are you sponsoring any exhibits in support of your testimony?

A. Yes. I am sponsoring the following exhibits:

- Petitioner's Exhibit No. 4-R, Attachment WDG-1R, a list of Brown Corrosion Projects from 2008-2018;
- Petitioner's Exhibit No. 4-R, Attachment WDG-2R, Indianapolis Power & Light's ("IPL") Harding Street Station Energy Information Administration ("EIA") Data.
- Petitioner's Exhibit No. 4-R, Attachment WDG-3R, Timeline For CCGT Construction
- Petitioner's Exhibit No. 4-R, Attachment WDG-4R, Capacity of Unfired CCGT

Q. Were the exhibits identified above prepared or assembled by you or under your direction or supervision?

A. Yes.

Q. What is the purpose of your Rebuttal Testimony in this proceeding?

A. Various witnesses from the Indiana Office of Utility Consumer Counselor ("OUCC"), Alliance Coal, LLC ("Alliance Coal"), the Indiana Coal Council ("ICC") and the Citizens Action Coalition/Valley Watch/Sierra Club ("Joint Intervenors") allege that customers face fewer risks if Southern Indiana Gas and Electric Company, Inc. d/b/a Vectren Energy Delivery of Indiana, Inc. ("Vectren South" or the "Company") retains its aging, uncompetitive, existing generation fleet for some period of time beyond 2024 rather than replacing several of these units with a highly efficient combined cycle gas plant ("CCGT"). While several other Vectren South witnesses will explain why these parties have reached the wrong conclusion, my testimony will focus on the significant risks presented from an operational standpoint by trying to keep these units running beyond 2024. I will explain the competitive challenges faced by our units in the Midcontinent Independent System Operator ("MISO") energy market, the risks with continued reliance on these units, and explain why the efficient CCGT the Company is seeking approval to construct presents lower risks. I also:

- Discuss issues with converting the Brown units from coal to gas fired.
- Discuss the project timeline and risks associated with delaying until the next IRP.
- Address why the preferred IRP plan offers diversity and why it makes sense to duct fire the proposed CCGT.
- Show the reduction in annual wholesale power margin due to Vectren South coal units not being competitive.
- Respond to criticisms from the OUCC that Vectren South's cost estimate is not reliable.
- Discuss recommendations made by the Industrial Group relating to contracting for construction of a CCGT.
- Explain that Vectren South did consider alternative scrubber technology at A.B. Brown.

I. Risk Is Not Mitigated By Delaying The Decision

Q. Can you summarize the position of the other parties regarding Vectren South's proposal?

A. Except for the Industrial Group, who represents specific Indiana customers, the other parties all contend that Vectren South should minimize risk by sticking with its existing resources in one form or another. ICC, Sunrise Coal and Alliance Coal, not surprisingly, want to keep the A.B. Brown facility ("Brown") burning coal, for as long as reasonably possible. This protects their own economic interests in ensuring continued demand for their product. The OUCC urges Vectren South to convert one or both of the Brown baseload units to utilize natural gas, continue operating the remainder of the generation fleet and wait for more certainty. The Joint Intervenors criticize Vectren South's modeling assumptions and make no specific recommendation beyond denial of our requested CPCNs.

Q. Is there a common basis these parties rely on to justify continuing with Vectren South's existing generation resources?

A. Yes. The parties all allege that retiring Vectren South's smaller coal units and building a larger gas plant is risky for customers. Other Vectren South witnesses discuss the modeling Vectren South has done and the assessment of risk involved in that modeling. In my role as Vice President of Power Generating, I am very familiar with the existing Company generation facilities the parties propose to keep running. There are numerous risks with continuing to rely on these units for the foreseeable future that the other parties ignore. I will discuss these risks and explain why Vectren South's proposed CCGT better mitigates customers' risk.

A. Risks From Continuing Vectren South's Heavy Reliance on Coal-Fired Generation

Q. What are the primary risks associated with continuing to operate a coal heavy fleet?

A. A coal heavy fleet, especially one dominated by small, aging plants, is exposed to risks from future environmental regulations, poor MISO market performance and reliability.

Q. Please discuss the risks created by environmental regulations applicable to Vectren South's existing generation fleet.

A. Coal plants face significant risks of rising costs and reduced efficiency from future environmental regulations. Vectren South has already made significant environmental control investments and the variable costs to operate this equipment places further pressure on the economics of the Company's generating facilities. For example, Vectren South spends in excess of [redacted] (an approximate [redacted] premium per MWHr generated) for the chemicals to remove sulfur dioxide (SO_2), nitrogen oxide (NO_x), sulfuric acid (H_2SO_4), particulate and mercury at Brown. The injection of sodium to control for H_2SO_4 at Brown has caused plugged nozzles and sodium build up in duct work necessitating outages to correct. In 2018, the Company must purchase seasonal NO_x allowances for Brown at a cost of $150-$350 per allowance. Brown's water treatment costs associated with its National Pollution Discharge Eliminations System ("NPDES") permit have increased to sample for several constituents and treat for mercury, oil and grease, suspended solids, total residual chlorine and copper and iron. Starting in April of 2020, Brown will incur more cost associated with treating water discharge for selenium, chlorides and copper.

As Company witness Retherford discusses, there continue to be risks of further environmental regulation as administrations change. This includes carbon regulation, stricter NPDES limits and the Environmental Protection Agency ("EPA") ratcheting down on SO_2 and NO_x allowance values and/or potentially changing these and other emission limits associated with coal fired units. The newly announced replacement to the Clean

Power Plan ("CPP") appears to require incremental efficiency improvements at coal fired power plants, necessitating additional capital investments. Vectren South improved the efficiency of Brown by installing dense packs in 2012 and 2013 at an incremental capital cost of $28.6 million. There continues to be a push by some to regulate carbon through a tax or other approach. This creates the risk of additional incremental costs for coal plants because of their significant carbon emissions.

Q. Please discuss the risks for coal-fired generation plants created by the MISO market, intermittent renewable resources, and low natural gas costs.

The MISO energy market dispatches the lowest cost generation required to maintain system reliability, giving MISO members the lowest cost energy available. Highly efficient CCGT natural gas plants and renewable resources are lower cost than the Company's small coal plants, contributing to falling capacity factors for the smallest least efficient coal units. These units must drop to minimum output or cycle off during the off-peak hours because they are higher cost than other resources, driving even higher production costs. These factors have a direct impact on customers. On a daily basis, Vectren South offers all of its units into the MISO market and purchases all of its customers' needs for electricity from the MISO market. On days when the Company's units are dispatched by MISO, the cost of the energy Vectren South purchases to serve its customers can be offset in part by the revenues paid by MISO for the energy sold into the MISO market. The higher costs associated with the low efficiency of Vectren South's coal units greatly reduces the opportunity for additional revenues used to reduce customer daily energy costs. Vectren South's units are particularly vulnerable because they are the smallest and some of the lowest efficiency (highest heat rate) units in the State. **Figure 1** shows the nameplate capacity of Vectren South's coal units compared to other Indiana Investor Owned Utilities ("IOU's") coal units while **Figure 2** shows the

efficiency or heat rate comparison of Vectren South's coal fleet compared to other Indiana IOU coal units. These Figures show only units anticipated to still be in operation in 2023. A lower heat rate indicates higher efficiency.

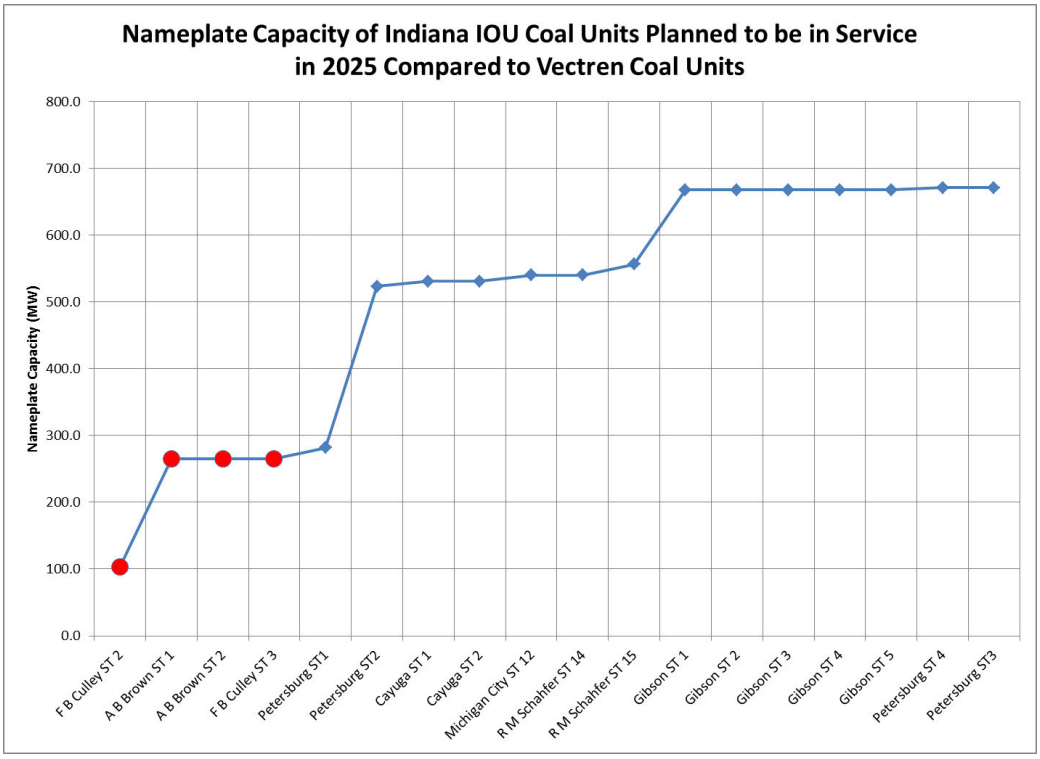


Figure 1

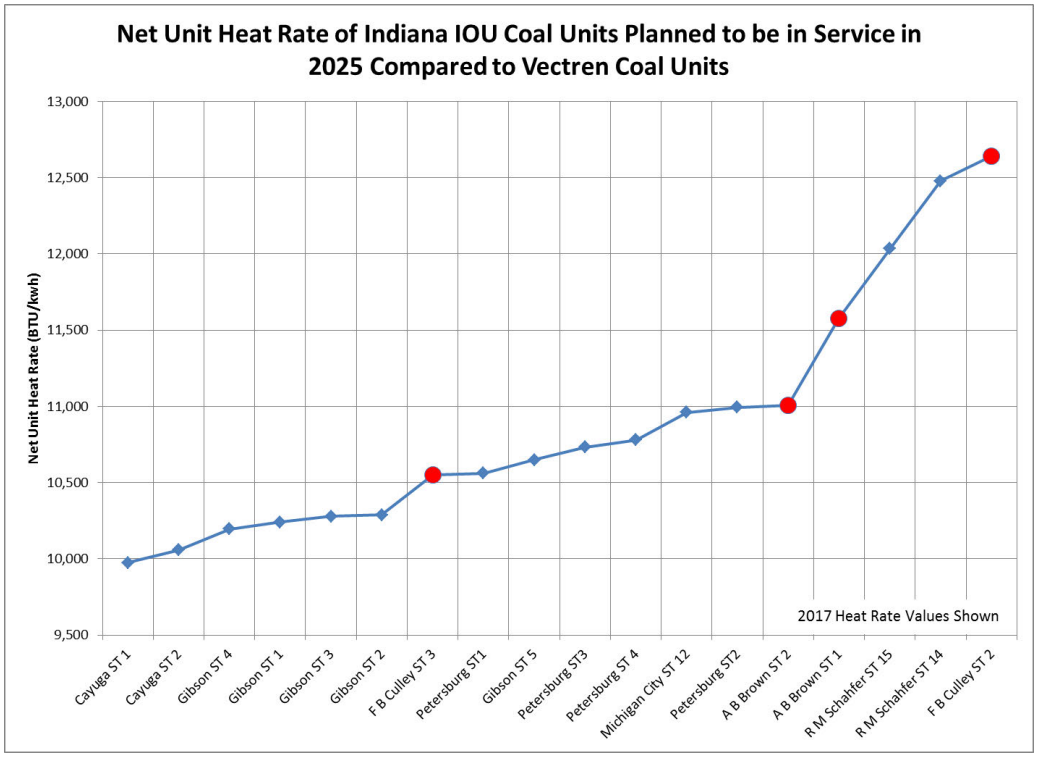


Figure 2

As shown by these Figures, maintaining Culley Units 2&3 and Brown Units 1&2 leaves Vectren South with the four smallest IOU coal units within the State. Except for Culley Unit 3, continuing to rely on these units would leave Vectren South's customers with among the most inefficient coal units within the State. Note that in the interest of maintaining diversity, Vectren South's preferred plan maintains Culley Unit 3 due to it being the largest most efficient coal unit in the current fleet.

Q. Please explain your concerns with the coal units being operated in a manner they were not designed for.

A. Vectren South's coal units were designed as base-load units, meaning that they were designed to continually run at relatively stable levels of output to serve the base needs of our customers. At the time they were constructed, the Company's coal units were very low cost and provided the most cost effective way to meet the demands of customers.

The advancement of technology and the dramatic reduction in the cost and abundance of natural gas have changed the dynamics for coal-fired units. The MISO "Day-Ahead" market dispatches generators that have been offered into the market (starting with the lowest cost source/unit) against hourly forecasted demand. The hourly market energy price is established by the last unit required to meet the demand. Renewables are typically dispatched first because of their low variable operation and maintenance ("O&M") costs and tax incentives that encourage renewable resources to be dispatched whenever they are available. This leaves other forms of generation to fill the gap between what intermittent renewable resources can produce and the changing requirements of retail customers on a real time basis. This gap which can fluctuate rapidly and widely is filled in the MISO "Real-Time" energy market by sources that can adjust (ramp) output quickly.

Due to the production cost (low efficiency) of Vectren South's coal units they are called upon to cycle off/on and ramp up/down more often than more efficient lower cost generation sources including larger super critical coal units. Cycling particularly impacts the Company's generating resources. This has the largest impact on units like Culley Unit 2 and Brown Units 1&2 as they are the smallest and more expensive coal units in the MISO stack. My Direct Testimony referenced a June 3, 2015 U.S. Department of Energy ("DOE") report on coal-fired generation titled "Impact of Load Following on the Economics of Existing Coal Plant Operations". The report recognized that "generally an increase in frequent ramping and/or shutdowns decreases the component life through damage caused by creep, fatigue, thermal shock, acid induced corrosion, erosion, and other stresses".[1] I discussed specific issues outlined in the report and an example of

[1] Creep damage occurs in metals and alloys after prolonged exposure to stress at elevated temperatures.

Solid Particle Erosion ("SPE") that occurred on Brown Unit 1 that caused a 3 month outage and $3.8M repair during the summer of 2016. Since submitting my original testimony other studies have been completed addressing the ramping and cycling issues on coal units designed for baseload operation and we've actually discovered more issues at the Brown plant due to increased cycling over the past 9 years. These include issues that will require more frequent inspections and extensive repairs or future replacement of costly high energy steam piping to ensure reliability of the plant as well as the safety of employees.

Q. How does this create additional risk for Vectren South customers?

A. There is expected to be a significant increase in the Equivalent Forced Outage Rate ("EFOR") and reduction in reliability over time. Vectren South's own experience demonstrates the risk that incremental capital, reduced plant life and increasing outages may result from trying to operate the Company's coal units in a fashion they were not designed for over an extended time period.

Q. Would efforts from the Federal government to monetize coal's resiliency attributes change Vectren South's concerns with continued reliance on its coal units?

A. Not as it is currently being proposed. ICC witness McConnell is referring to a draft memo of the Department of Energy ("DOE") that discussed the possible subsidization of certain coal and nuclear facilities for a two year period. The memo provided no detail regarding how such subsidization would work, the nature of the monetary benefits, and the identification of units selected to benefit from payments. Regardless of such speculation, Vectren South's plan calls for its coal plants to operate through 2023, well beyond this two year period. The Company's operating region is surrounded by large coal units such as Rockport, Gibson and Petersburg that are not currently scheduled to

be retired that would appear to fit more within the DOE's view of resiliency than Vectren South's small coal units.

Q. Do others recognize the same concerns you are raising with continued reliance on coal fired generation?

A. Yes. Just this week a draft report by the National Coal Council ("NCC") entitled "Power Reset: Optimizing the Existing U.S. Coal Fleet to Ensure a Reliable and Resilient Power Grid" became public. ICC witnesses Medine and McConnell, Alliance Coal witness Nasi, and Sunrise Coal witness Dombrowski are all listed authors or committee members. The NCC Report discusses how renewable energy resources impact coal units, and identifies concerns with cycling of coal units, lower revenues for coal units, lower efficiency, and reduced plant life attributable to the same factors I identify for the Company's units. The NCC Report admits that the wear and tear experienced by coal units has led to a point where the reliability of such plants "could be significantly less" and that such cycling conditions result in "increased capital expenditures, increased O&M costs, increased outages and higher fuel consumption."

Q. OUCC witness Alvarez contends that Vectren South's coal units performed at par in some years, and even better in other years, than the entire coal fleet of the country. (Public's Exhibit No. 2, pp. 16-17). Does this history of availability support the proposal to just keep running these plants well beyond 2023?

A. No. While I am pleased the OUCC agrees that Vectren South has done such an effective job operating plants, the more pertinent economic question is how well coal-fired generation is performing in the energy markets. The retirement of coal-fired generation facilities is being announced throughout the country because their high-heat rates and limited ability to ramp is rendering them less economic, especially when

competing with highly efficient gas plants using low cost gas. **Table 1** shows that Brown Units 1&2 and Culley Unit 2 capacity factors have dropped significantly from 2000-2008 to 2009-2017. **Figure 4** shows the Company's annual Wholesale Power Market ("WPM") margin since 2000, establishing that the Company's units are generating wholesale power sales much less frequently since gas prices began dropping in recent years.

	2000-2008	2009-2017
A.B. Brown 1	72%	52%
A.B. Brown 2	76%	55%
F.B. Culley 2	69%	23%

Table 1

WPM ANNUAL MARGIN - 2000 to 2017

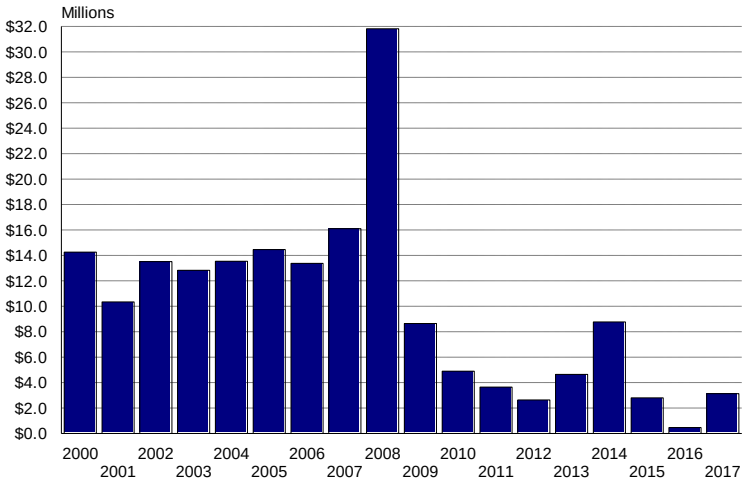


Figure 4

These factors are driving coal plant retirements throughout the country. Data compiled by SNL (S&P Global) shows that 458 coal units constituting over 52 gigawatts ("GWs") of capacity have been retired nationwide since 2012 with 97 of those located in the MISO footprint. Another 85 unit retirements making up another 16 GWs have already been approved for retirement in the U.S. with many others announced but not yet approved. Maintaining a high reliance on aging, small inefficient coal units that require environmental investments and are not designed to provide the flexibility needed to

operate in the MISO market is not a good decision for Vectren South customers. Continuing to rely on coal units to provide 95% of our energy would make the Company an extreme outlier when compared to other US investor owned utilities.

Q. OUCC witness Alvarez contends that replacing the Company's existing smaller units with a single CCGT exposes customers to the risk of reliance on a single unit that could have an outage. (Public's Exhibit No. 2, pp. 11 and 16). Do you agree that this represents greater risk compared to operating the existing coal fleet?

A. No. First, having a new unit designed to effectively ramp production provides greater reliability than operating coal units that simply were never intended to operate in response to dynamic MISO price signals. The risk of older coal units being off line due to either economics or equipment failure is the greater risk. Second, if the CCGT experiences an outage, in the short-term the MISO market can provide energy for customers. Buying energy when needed in the short-term does expose customers to price risk, but that is different than basing a long term resource plan (and meeting MISO Planning Reserve Margin ("PRM") requirements) on the availability and price of market capacity.

B. Specific Risks from Reliance on Brown Units 1 and 2

Q. ICC witness Hayet proposes to continue operating Brown until 2023 (for Unit 1) and 2030 (for Unit 2), ICC witness Medine advocates operating them for another ten years while OUCC witnesses urge converting the units to burn natural gas and continuing their operation indefinitely. What is Vectren South's experience with Brown?

A. Although the Brown units are the newest coal units within Vectren South's fleet (they will be 44 and 37 years of age in 2023), only Culley Unit 2 is more expensive to operate and maintain. Brown requires the largest capital investment among Vectren South's fleet to continue reliable operation beyond 2023. Apart from Coal Combustion Residual ("CCR") regulation compliance costs, a key challenge for these units is their dual-alkali scrubbers. Dual-alkali scrubbers require expensive chemicals to lower emissions and create a highly corrosive environment that impacts the scrubbers and other plant equipment. The industry has abandoned the dual-alkali scrubber as a result of these challenges and the Brown scrubbers are the only dual-alkali scrubbers still operated by a utility in the United States.

The corrosive environment created by the dual-alkali scrubbers causes regular damage to the infrastructure necessitating capital investment to repair the damage so the plants can continue to operate. As shown in Petitioner's Exhibit No. 4-R, Attachment WDG-1R, over $32M (an average of over $2.9M annually) has been invested to address Brown's corrosion issues to keep the facility reliable and safe for employees. Even if the scrubbers were replaced, remaining equipment impacted by the scrubbers' corrosive chemicals would require repairs. In 2005, a bridge spanning a Brown Unit 1 storage tank collapsed due to corrosion, shutting the unit down for an extended period of time to make repairs.[2] In 2017, over $1M was spent to rebuild a support structure holding ductwork that carries flue gas between the absorber tower and the chimney. Vectren South developed estimated capital and O&M projections for investments to keep Brown running for purposes of its integrated resource plan ("IRP") modeling, but it is very

[2] A picture of this bridge is labeled as photo 27 in Petitioner's Exhibit No. 4, Attachment WDG-1.

difficult to accurately project the capital and other expenses necessary to keep a plant operating with two scrubbers that are causing so many issues.

The scrubbers are already beyond their 30-year design life. Burns & McDonnell's ("B&McD") assessment of these scrubbers, attached to my direct testimony as Petitioner's Exhibit 4, Attachment WDG-1, concluded that "it would be prudent for Vectren South to retire and/or replace the Brown scrubbers at a total life of 40-45 years maximum, which implies the scrubbers should be retired and/or replaced sometime over the next 5-10 years". ICC witness Hayet accepts this for purposes of his modeling although Ms. Medine appears to advocate for stretching operation even beyond this recommended period. Vectren South is proposing to retire Brown Unit 1 when its scrubber is 44 years old and Brown Unit 2 when its scrubber is 37 years old, well beyond the 30-year design life. From a safety and reliability perspective, I do not agree that it is prudent to push the life of these scrubbers beyond 2023.

Q. OUCC witness Aguilar dismisses Vectren South's concerns with loading fly ash onto barges at Brown by indicating that the Company "may have to investigate the cost to temporarily store fly ash [at Brown] for occasions when barges cannot be loaded." (Public's Exhibit No. 1, pp. 21-22). What would it cost to address this concern?

A. Options and capital cost to modify Brown dry fly ash system were evaluated by Black & Veatch ("B&V") who estimated the price of viable alternatives would be around [redacted] This further demonstrates the costs of trying to keep Brown operating with coal.

Q. Are there other risks with continuing to rely on the Brown units?

A. Yes. Since 2008, the Brown plants and Culley Unit 2 cycle more than any other Vectren South plant because they are not competitive in the MISO energy market. I have already

discussed the additional wear and tear this creates for coal-fired units. Several specific issues have been identified at Brown as a result of cycling. Recent assessments of High Energy Piping which transports high pressure steam at Brown show signs of creep damage and other fatigue that will rapidly worsen due to cycling and will require replacement if operated beyond 2023. The Brown Unit 1's super-heater outlet header will need to be replaced due to thermal fatigue and scale build-up. Other welds at Brown show signs of creep damage while others have been determined to be at high risk for creep damage. Creep damage places pipe and welds in a condition that will make them more susceptible to the impacts of cycling. I expect more of these issues as routine inspections are completed over time.

Q. What risk does continuing to rely on Brown create for customers?

A. Based on my experience overseeing Brown's operation, there is a significant risk that capital expenditures to keep Brown operating will turn out to be higher than projected in the IRP modeling, and a very low likelihood that costs will be less. The timeline to replace Brown is a multi-year process and Vectren South may be boxed into making investments in Brown to enable it to continue reliably serving its customers while going through the process to procure reliable replacement generation.

Vectren South will minimize near term (2017-2023) investments previously planned while ensuring adequate reliability is maintained if a CPCN for the new CCGT is approved. Some examples of avoided capital and O&M work that would be required to keep Brown operating beyond 2023 are listed in **Table 2**. Completion of this work will not guarantee avoidance of other equipment failures.

Deferred Investment in Brown Due To Retirement	Cost
Water-Wall tube replacements	[redacted]
Additional cyber security investments	[redacted]
FD Fan overhaul dampers and housing (2)	[redacted]
Unit 2 economizer inlet header replacement	[redacted]
Replacement of insulation and ladding	[redacted]
Major ductwork and expansion joint replacement	[redacted]
Units 1 and 2 boiler chemical cleans	[redacted]
U2 catalyst replacement	[redacted]
Coal handling switchgear replacement	[redacted]
Superheater inlet tubes	[redacted]
Unit 1 superheat outlet header	[redacted]
Unit 1 and 2 coal pipe replacements (all straight runs)	[redacted]
Units 1 and 2 air heater overhauls	[redacted]
Unit 2 480 switchgear to operate plant equipment	[redacted]
Replacing the river well piping	[redacted]
Unit 1 480 switchgear to operate plant equipment	[redacted]
Unit 2 partial cooling tower cell rebuild	[redacted]
Turbine generator overhauls on both units	[redacted]
Total	30,290,000

Table 2

Q. The OUCC contends Vectren South should more thoroughly evaluate converting Brown to burn natural gas. Did Vectren South assess this option?

A. Yes. Vectren South engaged Babcock & Wilcox Co. to prepare an analysis of the coal-to-gas conversion. I agree with OUCC witness Alvarez that Brown could be converted to burn natural gas at a much lower up-front capital cost, but a gas-fired Brown would be very inefficient because of its high heat rate and fuel cost and rarely dispatched. In short, customers would be paying rates for capacity and then largely depending on MISO for energy purchases to actually serve their day to day needs. **Table 3** shows that the fuel cost (example has $4.00/mmBtu natural gas price) to generate a MWHr from a gas-converted Brown unit is $20 more expensive than a MWHr generated by the proposed "F" class CCGT.

	Heat Rate	Fuel cost/MMBtu @ $4/MMBtu Transportation	Approximate Fuel cost/ MWHr
Brown Coal Unit Converted to Gas	11,760	4.00	[redacted]
Proposed CCGT	6,560	4.00	[redacted]

Table 3

Q. Did Vectren South include any coal to gas conversion in its modeling?

A. Yes. Vectren South's initial IRP modeling considered, but did not select as a low cost resource, converting Culley Unit 3 to gas. In response to the OUCC's concerns, Vectren South witness Lind evaluated the total cost to ratepayers of a portfolio that converted Brown to operate on gas. This updated modeling demonstrates that it is more expensive when considering total costs to customers to convert Brown to operate on gas, primarily because of the need to make energy purchases to serve customers because of the high cost and inefficiency of a gas-converted Brown.

Q. Why would a utility convert a coal plant to burn gas given its inefficiency and high cost?

A. Utilities with large generation portfolios sometimes convert smaller coal units to burn gas if they need capacity. These utilities use their large, low cost generating units to serve customer load the majority of the time and cost effectively satisfy capacity needs to satisfy MISO's PRM with gas-converted coal plants.[3] In contrast, converting the Brown units to gas would leave Vectren South without sufficient low cost energy to serve its customers on a daily basis. For this reason, Vectren South's IRP modeling did not consider converting Brown to gas.

[3] Company witness Justin Joiner explains MISO's PRM in more detail. In short, MISO requires market participants to maintain a specified amount of capacity to ensure that the MISO region can satisfy needs experienced during peak periods.

Q. Mr. Alverez points to IPL Harding Street coal to gas conversion as an example of a low cost solution that has been successful. Does IPL's experience suggest converting Brown to a gas burning facility would be a prudent course?

A. No. IPL meets the criteria I just discussed—it has constructed a large new CCGT that can meet the majority of its needs and relies on Harding Street primarily for capacity. According to Harding Street EIA data provided as Petitioner's Exhibit No. 4-R, Attachment WDG-1R, the heat rate at Harding Street increased by approximately 15% and capacity factors have fallen from the 70% range into the teens. Harding Street's capacity factor is actually better than most coal to gas conversions and may indicate that transmission limitation around the Indianapolis area or other factors are helping Harding Street perform better than most coal to gas conversions. There have been 51 coal-to-gas conversions across the U.S. between 2013 and 2018. The majority were small units that converted to avoid high dollar investments to comply with the 2016 Mercury and Air Toxic Standard ("MATS") deadlines. The capacity factor for these units dropped from an average of over 40% to below 5% and heat rates rose from 10,800 to 12,500. Nineteen units in MISO have been converted from coal to gas and their heat rate increased from approximately 11,500 to 15,400 and capacity factors declined from a 60% average to less than 5%. Harding Street, MISO and Vectren South coal to gas conversion information is provided as Petitioner's Exhibit No. 4-R, Attachment WDG-2R.

Q. Are there any other potential costs to customers that Mr. Lind's modeling of gas-converted Brown units did not consider?

A. Yes. Because these units would not run frequently, customers could be exposed to congestion charges for the energy they require. The Locational Marginal Price ("LMP") paid for energy purchased from the MISO market consists of the energy, congestion and

line loss.[4] Transmission and distribution systems were designed to serve customers from local generation sources. When energy is imported from long distances, transmission lines can become stressed or overloaded. One way MISO balances the system and ensures reliability of the transmission grid is by assessing a congestion charge component of the LMP to encourage generation to operate (or be constructed) or not operate depending on the needs of the transmission system. Congestion can be positive, increasing the price MISO pays for energy incenting the seller to increase production or negative, which reduces the price MISO pays for energy incenting the seller to reduce or stop production.

Q. Do you have an example of how congestion can impact the LMP of non-localized generation?

A. Yes. Vectren South has two Purchase Power Agreements ("PPAs") in place for wind from Benton County Indiana with Benton County Wind Farm and Fowler Ridge II Wind Farm. **Table 4** shows the average five year congestion component of the LMP paid by Vectren South customers for the two wind farms compared to five year congestion component of local generation at the Brown and Culley locations. The congestion for the wind farms is much higher than for local generation. **Table 5** shows the number of hours that Vectren South has experienced negative LMPs for the two wind farms compared to Brown and Culley over the past 5 years. Note that there is a much higher congestion charge and many more negative LMP hours for generation that is farther from the load it is designated to serve.

[4] LMP is the hourly price for energy set by the last unit needed to meet demand in an area.

Generation Source	Day Ahead Average Congestion Component (Paid By Load) Of The LMP	Real Time Average Congestion Component (Paid By Load) Of The LMP
Brown		
Culley		
Benton County		
Fowler Ridge		

Table 4

Generation Source	Day Ahead Hours with Negative Pricing	Real Time Hours with Negative Pricing
Brown		
Culley		
Benton County		
Fowler Ridge		

Table 5

C. Risks With Continued Reliance on Culley Unit 2

Q. OUCC witness Aguilar contends Vectren South could continue to operate Culley Unit 2 and utilize the benefits of sharing environmental compliance equipment with Unit 3. (Public's Exhibit No. 1., p. 22). Why is the Company proposing to retire Culley Unit 2?

A. I explained in my Direct Testimony (Petitioner's Exhibit No. 4, p. 21) the reasons why retiring Culley Unit 2 is the best option for customers. Ms. Aguilar has not addressed any of the concerns with continued operation of Culley Unit 2 identified in my Direct Testimony. She relies only upon Culley Unit 2's ability to share environmental compliance equipment with Culley Unit 3, but fails to acknowledge that a minimum of $70 million in additional capital investments are required to continue operating Culley Unit 2 through 2036. In part, this investment is driven because Culley Unit 2 cannot solely rely on Culley Unit 3 for environmental compliance costs. A dry bottom ash system must be installed to comply with CCR and further investments may be required to comply with section 316b of the Clean Water Act (designed to protect fish and other aquatic wildlife at water intake and outfall structures) on the design and operation of the current river intake structure. In addition to these environmental costs, Culley Unit 2's

distributed control system ("DCS") is a Honeywell system installed in 2000 and must be updated or replaced because it is obsolete. A few other significant capital investments that would be required to keep Culley Unit 2 operating beyond 2023 include a turbine major overhaul, boiler acid clean, main transformer overhaul/replacement, major boiler component replacement, dry stack ductwork replacement, ID fan discharge ductwork, coal conveyor gallery replacement, boiler/high energy piping condition assessment, air heater basket replacement, continued overhaul of circulating water pumps and traveling water screens, and replacement of two 480-volt motor control center electrical switchgear.

Investing so heavily in a unit as old and inefficient as Culley Unit 2 is not economic. Vectren South's modeling bore this out. Due to the higher cost to operate, the unit has experienced less overall run time and much more unit cycling. Culley Unit 2 has reached the end of its useful life and should be retired rather than continuing to spend capital keeping the inefficient unit operating.

D. Risks From Continued Reliance on Warrick Unit 4

Q. What is the basic contractual arrangement related to Warrick Unit 4 with Alcoa?

A. Vectren South and Alcoa are parties to Joint Operating Agreement ("JOA") pursuant to which each has 50% ownership (150 megawatts ("MW") each) in Warrick Unit 4. Warrick Unit 4 came on line in 1970 and will be 54 years old in 2023. The unit sits on Alcoa property along with three other (150 MW each) units referred to as Warrick Units 1-3. Alcoa personnel are responsible for daily operations and maintenance decisions. Vectren South provides input through an Operating Committee that meets regularly.

Q. OUCC witness Aguilar testifies that she does not agree with Vectren's assessment of the risk of continuing to operate under the agreement and she specifically

describes that the OUCC does not agree with Vectren South's "presentation of the agreement." (Public Exhibit No. 1, p. 23). Please respond.

A. Witness Aguilar does not address Vectren South's specific concern that Alcoa has [redacted]. This concern was explained by the Company in the OUCC data request cited by Ms. Aguilar (Public's Exhibit No. 1, p. 23 fn. 31).

The original agreement provided Alcoa [redacted] and a 2001 amendment afforded either party the ability [redacted]. That [redacted] in a 2017 amendment due to ALCOA's corporate reorganization and operational uncertainty described by Company witness Chapman. Capital investments in Warrick Unit 4 must be evaluated in terms of the risk that Alcoa will exercise its [redacted] and, in effect, [redacted]. The decisions that might lead Alcoa to exercise its contractual rights arise from its own business economics and, particularly, the aluminum business.

Q. Are future environmental capital investments in Warrick Unit 4 necessary?

A. Yes. Due to compliance requirements coming in Alcoa's next NPDES permit, it is anticipated that the unit will require a significant capital investment to eliminate the plant's direct discharge to the Ohio River. This would require a Waste Water Treatment facility to treat the FGD waste stream and any process stream entering the ash pond prior to discharge. Also, Alcoa may be required to comply with section 316b of the Clean Water Act under this new permit which could include a reengineered design to the river intake system. Company witness Retherford discusses the Warrick site environmental risks in greater detail.

Q. Are there other factors that warrant against continued reliance on Warrick Unit 4?

A. Yes. Mr. Chapman notes that Vectren South wanted to keep one coal unit to avoid the all gas portfolio modeling demonstrated was the lowest cost portfolio. We focused on our best performing coal unit, Culley Unit 3. Warrick Unit 4 was considered, but the contractual concerns and the unit's performance led us to select Culley Unit 3.

Q. Please describe the performance issues at Warrick Unit 4 that made Culley Unit 3 a more attractive unit for the future.

A. The operating unit itself has become more susceptible to forced outages in recent years. **Table 6** shows that in all but one of the previous six years, the unit's EFOR has been well above the industry average of 8.56% with the last two years being over 17% (over twice the industry average).

	2012	2013	2014	2015	2016	2017
Warrick Unit 4 EFOR Rate	12.75	11.75	15.2	4.8	17.8	17.3

Source: PowerGADS (MISO) GORP Report
Table 6

Along with boiler tube failures, Alcoa has incurred multiple large mechanical and operational failures contributing to the high EFOR. Recent examples include a prematurely failed selective catalytic reduction ("SCR") catalyst layer, issues with air heater internals, boiler control failures due to DCS feedback and field device failures, and emission restricted shut downs. Warrick Unit 4 is also minimum load restricted (228-350 MWs) due to a failed duct burner on the SCR that maintains the unit's exit gas temperature minimizing unit corrosion due to flu gas reaching acid dew point.

E. Risks from Continued Reliance on BAGS Unit 2

Q. Please describe Vectren South's Broadway Avenue Gas Station ("BAGS") Unit 2.

A. BAGS Unit 2 is a simple cycle, 65 MW gas turbine constructed in 1981. The unit will be 44 years old when Vectren South projects retirement in 2025. BAGS Unit 2 will be well past its expected 30-year life. Due to its age, BAGS Unit 2 is not a very efficient unit, operating with a heat rate of over 14,000 in 2017 compared to the proposed new CCGT's anticipated heat rate less than half of this. Recall that a lower heat rate is indicative of greater efficiency.

Q. Are there risks with continuing to operate BAGS Unit 2 for the foreseeable future?

A. Yes. OUCC witness Alvarez's primary criticism is that Vectren South has provided insufficient support for the proposed retirement of BAGS Unit 2 (Public's Exhibit No. 2, p. 14). The data request response he refers to sought "any engineering or other technical reports performed by or on behalf of Vectren South identifying the need to retire the 'Natural Gas' units. The Company is not relying on engineering or other technical reports to support this conclusion. We are planning to retire it 14 years beyond its estimated useful life. As explained in the data request response, Vectren South has trained staff that includes a turbine engineer that supervises the operation and maintenance of the gas peaking units. Our staff has numerous years of experience operating and maintaining natural gas compressor and turbine/generator sets and intimate knowledge of BAGS Unit 2. They have assessed the condition of the unit and found significant risks with continuing to operate it.

Q. Please identify the specific concerns with continued operation of BAGS Unit 2.

A. During normal operation and maintenance activities, long term issues have been found which would require a major re-build of the unit to keep it operating beyond 2025. Our team has identified a damaged turbine casing, the need for exhaust diffuser replacement, replacements of multiple rows of blades and stationary vanes in both the

compressor and turbine, a requirement to re-wind the generator stator and rotor, first stage shroud block cracks, leading edge blade damage, and axial movement on the inner guide vanes. Vectren South's modeling appropriately called for the retirement of BAGS Unit 2.

Q. Does Vectren South take seriously its responsibility for keeping assets in good operating condition, operating efficiently, and attaining higher capacity factors?

A. Yes. Vectren South's success in this regard is supported by OUCC witness Alvarez's testimony noting how well our coal plants compare from an operational standpoint to other coal facilities in the nation. (Public's Exhibit No. 2, pp. 16-18). However, operating efficiently may mean determining when to retire units that are well past their useful lives rather than continuing to pour money into the units. Theoretically, Vectren South could ensure that it never retired any generation facilities if that was the goal. But that is not the goal. Throughout his testimony, OUCC witness Alvarez suggests that the only thing that matters in efficiently serving customers is maintaining sufficient capacity, by maintaining existing units, to ensure Vectren South can satisfy its MISO PRM requirements. However, determining the value in pouring money into old inefficient units with short life spans requires a more thorough analysis, including determining whether the existing units are still the most cost effective means of providing service.

Q. OUCC witness Alvarez contends the Company should not have included BAGS 1 in its list of units to be retired. (Public's Exhibit No. 2, p. 13) Why did Vectren South identify BAGS Unit 1 as a unit to be retired?

A. While Mr. Alvarez is correct that BAGS Units 1 has not received any capacity credit from MISO since 2014. Vectren South had classified BAGS Unit 1 in MISO's "temporary suspension" status for the allowable three years period. Prior to 2018, BAGS Unit 1 had

not been retired. A temporary suspension status allows a utility time to evaluate the failure of a unit to determine whether investments to bring it back on line are appropriate. BAGS Unit 1 failed in 2015 and the inspection to determine the scope of work and costs to repair the unit concluded that the estimated cost to get the unit operational would be $18 million and that further capital would be required to address several other issues to ensure long term reliability. The unit was 44 years old (same age BAGS 2 will be in 2025 when we are projecting it will retire) and well past its expected life of 30 years. The temporary suspension status provided Vectren South the option to spend the dollars to place the unit back in service prior to mid-2018 if it was determined beneficial. In early 2018, Vectren South submitted the necessary paperwork requesting permission to retire the BAGS Unit 1. The unit was officially retired in early 2018. Therefore, it was appropriate to identify it in the list of resources being retired from Vectren South's fleet.

F. Risks Of Delaying The Decision To Construct a CCGT

Q. Some have suggested that Vectren South should delay the decision to construct a CCGT and wait for the results of the 2019 IRP. Do you agree with this strategy?

A. No. This approach ignores (1) the timing by which Vectren South must make decisions about Brown's continued operation; (2) the timing required to construct a new CCGT and (3) the time required to complete a 2019 IRP and obtain a CPCN. Company witness Retherford explains that environmental regulations will require retirement of the Brown units on or before December 31, 2023 unless significant capital investments are made to have new systems operating well before 2023 as described by Company witness Retherford. When the 2019 IRP modeling is concluded and again recommends construction of a CCGT, there will not be sufficient time to construct the CCGT before Brown must be retired. I have provided a timeline as Petitioner's Exhibit 4-R, Attachment WDG-3R to highlight the challenges. The timeline shows the current

projected schedule in green and the timeline under the 2019 IRP in red. Delaying this would push the schedule out 2-3 years (2026/2027 timeframe), leaving customers vulnerable to market capacity and energy prices to reliably serve our customer base during this period. Such an approach would be highly risky and is not a prudent manner in which to operate a utility with an obligation and commitment to industrial, commercial, government, health care, schools and residential customers relying on us to provide reliable electric service.

II. The CCGT Is Reasonable

Q. Several of the intervenors have challenged the size of the proposed unit. Do you agree with their criticisms?

A. No. The primary unit Vectren South is proposing to build does not result in the Company having more capacity than is necessary to serve the projected load over the twenty year planning horizon. The proposed "F" class unit supplies about 700 MWs of baseload generation (prior to making a reduction for summer output and Unforced Capacity ("UCAP") associated with historical forced outage explained in more detail later in my testimony). A unit this size was required to keep costs low, efficiency high and obtain enough capacity to meet Vectren South's PRM with an extra 51 MWs in 2025. This replaces 730 MWs of baseload coal. Petitioner's Exhibit No. 4-R, Attachment WDG-4R, depicts how the baseload capacity matches Vectren South's anticipated needs from the 2016 IRP.

Q. Are there risks that the MISO PRM requirements change or that Vectren South's load increases rendering the additional capacity beneficial?

A. Yes. I discussed in my direct testimony examples of how the MISO PRM requirements have changed in the past and Company witness Joiner explains how the MISO PRM

requirement is established and several determining criteria that cause the level to fluctuate annually. I also discussed how holding a capacity surplus is necessary to ensure Vectren South can meet the annual changes in PRM requirements as well as attract new business.

Q. What is the basis for the contention made by the OUCC and ICC that the CCGT has more capacity than necessary for Vectren South to meet its projected needs?

A. Vectren South has proposed to add duct-firing to the CCGT. The duct-firing produces additional steam for the steam generator to increase the amount of electricity it can produce. The incremental cost of adding duct-firing is only $15 million and it produces approximately 150 MWs of additional capacity. The fired portion serves as peaking capacity, allowing Vectren South to supply energy during periods of peak demand and high market prices. Firing the unit cannot be cost-effectively added after the facility is constructed. While constructing the CCGT with duct-firing results in more capacity than our projections indicate is required, the relatively small cost and inability to add it later led us to propose this as part of the CPCN. The 2% increase in cost adds 20% of capacity. This extra capacity can be utilized to help attract new industrial and commercial customers to Evansville or sold into the wholesale market.

Q. Why do you refer to the duct firing as peaking capacity?

A. The air permit will limit the annual tons of Volatile Organic Compounds ("VOCs") being released from the CCGT. The VOCs increase on a per MWHr basis when duct firing which will limit the number of annual hours the unit can be duct fired without exceeding the annual VOC emission limit anticipated in the air permit. Vectren South will monitor VOC emissions and employ the duct firing when MISO demand and energy prices are highest, therefore, only operating during peak times. Vectren South's analysis indicates

that VOC emissions limit will not curtail use of the fired piece of the unit, but this limitation supports viewing the duct firing as peaking capacity because it will not be available at all times to serve Vectren South's typical demand.

Q. Does Vectren South have any recommendations if the Indiana Utility Regulatory Commission ("Commission") shares the concern about the need for the capacity resulting from firing the CCGT?

A. Yes. Vectren South witness Chapman has stated that Vectren South is willing to fund the duct-firing portion of the CCGT through shareholder dollars, exclude this piece from future rate base, and accept the risk to recover the investment through wholesale sales energy produced by the duct-firing.

Q. Besides being the lowest cost option for the customer what are some of the other reasons a CCGT is a practical option?

A. The "F" class technology is a highly durable, proven design that has logged numerous operating hours across the power industry. Given the current MISO market and projected market changes discussed by Vectren South witness Joiner, the CCGT has the necessary operating characteristics and flexibility to better react to changing demand and provide the reliable service to our customers. First, the CCGT can ramp output up and down at a rate of 80 MWs per minute providing the flexibility to meet the changing demand requirements created by intermittent resources. This compares to our current coal units that ramp output up and down at a rate of 3 MWs per minute. Second, the unit will be designed with the ability to cycle off and back on nightly if necessary to allow customers to take advantage of low market prices during the off-peak hours when available. The proposed CCGT can start back up from a cold condition in less than an hour, warm condition in 30-40 minutes and hot condition in less than 30 minutes. The

Brown units require 18-24 hours for a cold start, 8-12 hours for a warm start and 4-8 hours for a hot start. The ability to ramp output, cycle on/off quickly and provide reliable capacity as units age are characteristics that have a high probability to create financial benefit in a MISO market that has already moved to a 5 minute pricing settlement period and is exploring market reforms that will reward unit flexibility in the ancillary services market discussed by Company witness Joiner.

The 2x1 "F" class unit consists of 2 sets of compressors, natural gas turbines and generators, heat steam recovery generators (boilers that convert water into steam) and one steam turbine and generator. Simplistically, air is pulled into each of the two compressors where it is compressed to high pressure, is mixed with fuel and ignited. This ignition and combustion moves a hot air fuel mixture through the gas turbine turning blades which drive a shaft within the associated generator producing electricity. The waste heat from each gas turbine enters its associated heat recovery steam generator ("HSRG") where purified water is heated and turned into steam. The high pressure steam enters the turbine. As the steam flows through the turbine blades, the blades turn a shaft connected to the generator. As the generator spins it produces electricity. This design is very efficient as the waste heat from the gas turbines is used to generate more electricity rather than being vented to the atmosphere. The unit has a wide range of output as it can be operated in a 1x1 configuration (one gas turbine/generator, one HRSG and one steam turbine/generator) producing over a range of approximately 180-420 MWs or a 2x1 configuration (two gas turbines/generators, two HRSG's and one steam turbine generator) producing over a range of 380-700 MWs. Duct firing can then be added for peaking. This provides a much wider range of output which is especially beneficial in the off–peak hours when demand and prices are low. Currently the normal minimum output for the Brown units is 135MWs each, Warrick 4 minimum is 114 MWs

and Culley 2 minimum is 50 MWs. This means that there are hours during the off-peak when MISO market prices are lower than the cost of our coal units but they can only turn down to 434MWs as compared to the CCGT which can turn down to 180 MWs in the 1x1 configuration and 380MWs in the 2x1 configuration.

Q. Why is the CCGT the lowest cost option?

A. The two primary reasons are the low cost of natural gas and the high efficiency rating of new CCGT technology as compared to Vectren South's coal fleet. The primary measure of efficiency of an electric generation unit is heat rate. Heat rate is the amount of energy in British thermal units ("Btus") used to generate a kilowatt hour ("kWh") of electricity. Heat rate can be expressed in "gross"; the Btu/kWh of total output of the generator (not including electric consumption to operate plant equipment) or "net"; the Btu/kWh (including electrical consumption to operate plant equipment). The lower the heat rate or number of Btu's required to produce a kWh of electricity the more efficient the generating source.

Q. How does the heat rate of the proposed CCGT compare to the coal units that intervenors are recommending Vectren South continue to operate?

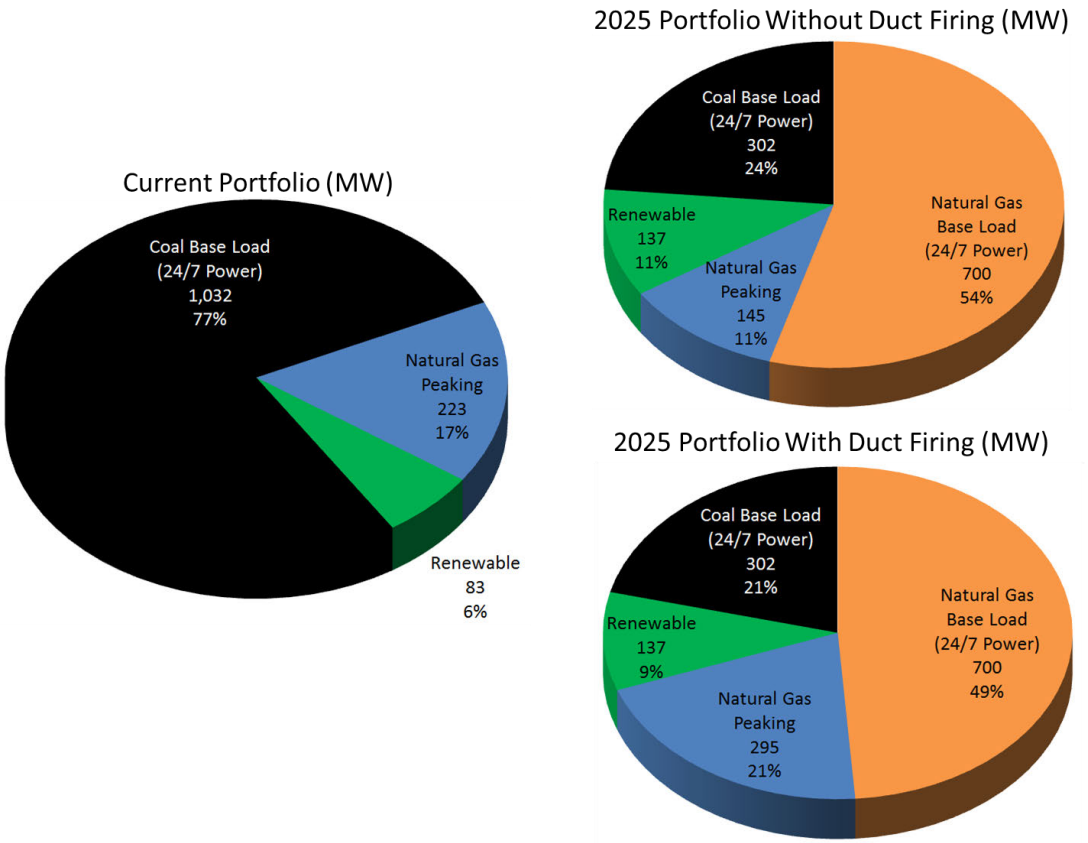
A. The proposed CCGT is expected to operate at an average heat rate of approximately 6,560 Btu/kWh. **Table 7** shows the heat rate of the Vectren South coal fleet.

	2017 Net Heat Rate
AB Brown Unit 1	11,576
AB Brown Unit 2	11,007
FB Culley Unit 2	12,662
FB Culley Unit 3	10,549
Warrick Unit 4	10,896
Vectren Coal Fleet Average	11,001
Typical "F" Class CCGT	6,560

Table 7

Q. OUCC witness Alverez (Public's Exhibit 2, p. 10) claims that Vectren South's preferred plan does not diversify its generation but swings the pendulum from 77% coal to 77% gas. Do you agree with his assessment?

A. No. Fuel diversity can be viewed from the perspective of baseload generation, peaking generation and intermittent generation. As discussed earlier, the Company views duct-firing as peaking generation. As shown in the pie charts below, Vectren South currently has 100% of its baseload capacity supplied by coal. In both the fired and unfired portfolio, this changes to 70% natural gas and 30% coal. When looking at the total portfolio, Vectren South currently has 78% of its total capacity supplied by coal, 16% natural gas peaking and 6% intermittent renewables. In the preferred portfolio with a fired CCGT scenario Vectren South will have 49% baseload gas, 21% baseload coal, 21% peaking gas and 9% intermittent renewables while the unfired portfolio would have 54% baseload gas, 24% baseload coal, 11% peaking gas and 11% intermittent renewables.



Q. Are you concerned that constructing the proposed CCGT is moving to a position of having too much reliance on one unit?

A. No. Although there may be certain advantages to have more than one CCGT, the cost of building the gas pipeline infrastructure, site preparation, engineering, and procurement of equipment construction and interconnect costs of two smaller units outweigh the benefits. The efficiency benefits and cost savings associated with building one larger CCGT is the best option. Building a 2x1 configuration allows Vectren South the flexibility to take one of the gas units off line for planned maintenance in the shoulder months when demand is lowest and operate in a 1x1 configuration producing up to 420 MWs. This energy along with the remainder of Vectren South's fleet will supply enough energy to serve Vectren South shoulder month demand the majority if not all of the time. As mentioned earlier although Vectren South doesn't feel it prudent to rely on the MISO

market for energy and capacity for long stretches we should, as MISO members, be able to rely on the market to supply energy in short stretches. If the entire unit is offline for maintenance or to address an operating issue, Vectren South would still have adequate energy with coal and renewables to meet over 40% of its peak demand.

Q. Does Vectren South expect to receive 850 MWs of capacity credit towards its PRM from the CCGT?

A. No. A CCGT's output is dependent on several variables; one being air density. Air density changes with the temperature. During the winter months air density is higher resulting in a CCGT producing more output. Air density in the summer months when temperatures rise to 90 plus degrees is lower resulting in a reduced output. In addition, as discussed by witness Joiner, MISO also penalizes units based on their UCAP performance history. Simplistically, UCAP is based on the demonstrated output of a unit under peak load conditions and percent of time it is not participating in the market due to being forced off-line as a result of operational or maintenance issues. Until the equipment manufacturer is chosen through a competitive bidding process the final summer output will not be known. Each year the UCAP values will change based on previous performance. As a result capacity credit for the unfired and fired portion of the CCGT can be different each year.

III. Cost Estimate Is Reasonable

Q. Did Vectren South develop a detailed cost estimate for the CCGT?

A. Yes. Vectren South witness Diane M. Fischer described in detail the extensive effort the Company invested in developing a very detailed cost estimate for the CCGT. While Ms. Fischer describes the process in great detail, it is important to emphasize that B&V, on behalf of the Company, solicited and evaluated competitive bids for all equipment and

construction for the CCGT based on conceptual designs of the CCGT. Ms. Fischer states that the cost estimate represents a +/- 10% estimate for equipment and construction.

Q. Mr. Alvarez criticizes Vectren South's cost estimate (Public's Exhibit No. 2, p. 26) alleging that Company witness Fischer "cannot stand behind [the] estimate without qualifications." Is his criticism valid?

A. No. Vectren South, in conjunction with B&V, has produced a very comprehensive and accurate cost estimate with a plus or minus 10% margin of error. It is still a cost estimate and the actual price may deviate somewhat from this estimate. However, the fact that this is an estimate does not render it unreliable for purposes of Commission consideration. Mr. Alvarez implies that rather than presenting the Commission with a cost estimate, it must provide an unqualified bid to construct the project for a set price. His position ignores that Ind. Code § 8-1-8.5-5(a) requires the submission of a cost estimate, not a firm price.

Q. Mr. Alvarez further criticizes the estimate for not being the result of a competitively bid engineering, procurement or construction contract. Do you agree with him?

A. No. As Mr. Alvarez recognizes, Ind. Code § 8-1-8.5(e)(1)(A) requires the estimated costs of the proposed generation facility of more than 80 megawatts to be "the result of competitively bid engineering, procurement, or construction contracts, as applicable" "to the extent commercially practicable." (Emphasis added) He disregards Vectren South witness Fischer's testimony that Vectren South's cost estimate is the result of competitively bid procurement and construction contracts. Petitioner's Exhibit No. 6, pp. 36-37. Mr. Alvarez may be ignoring the use of the conjunctive "or" in the statute and

misreading the statute as requiring presentation of an engineering, procurement and construction or EPC contract. In an EPC contract, the contractor is responsible for obtaining all specified equipment, designing the plant, constructing the plant and assuming the project cost. The statute does not require an EPC contract as evidenced by the language providing the option of competitively bid engineering, procurement or construction contracts.

Q. Would it be commercially practicable for Vectren South to obtain an EPC contract bid and present it to the Commission in conjunction with a CPCN request?

A. No. A contractor offering a bid on a contract incurs significant expense in developing these bids. Costs can range from $300,000 to $1 million for the bid preparation. An EPC contract often includes a firm price, which requires the contractor to be very thorough in providing a bid. Contractors will not put the investment into developing firm bids simply for Vectren South to submit them to the Commission for approval in a CPCN proceeding. The length of time required for approval of a CPCN also makes it commercially impracticable to obtain a firm EPC contract bid as conditions change over time (supply & demand impacting commodity prices, labor market availability, *etc*.) resulting in high contingency being included in the firm bids to ensure adequate profit margins. In addition waiting for a CPCN places Vectren South in a much better position to create a competitive market and negotiate terms as bidders will be much more serious once they know there is an actual project they are investing the time and effort to earn.

Q. Do you agree with Mr. Alvarez that there are "red flags" in the proposed cost estimate that signal price escalation, construction-scheduling uncertainty, and lack of general confidence in its ability to undertake projects of this magnitude (Public's Exhibit No. 2, p. 28)?

A. No. Vectren South employed B&V to develop this +/-10% cost estimate as they have extensive experience as an EPC contractor and an Owners Engineer involved in several CCGT projects. They used the same cost estimating practices and review they use when bidding a project as an EPC. The typical costs for an "F" class combined cycle gas turbine project are well known as there are over 258,000MWs of combined cycle output in the United States. This is in contrast to the Edwardsport and Mississippi Powers Integrated Gasification Combined Cycle ("IGCC") technology that Industrial Group witness Michael Gorman unfairly points to as examples of over budget and over schedule projects. These were first of a kind technology projects that were not proven. Vectren South originally partnered with Duke on Edwardsport but bowed out before the project started largely because of the difficulties confirming the prices.

The OUCC's "red flags" comment ignores the entire body of work performed by Vectren to put together a very detailed estimate for the Commission. Vectren South and B&V performed a significant level of conceptual design to develop the estimate for the CCGT. This includes development of site arrangement drawings, a full set of flow diagrams, a detailed bill of quantities, a detailed project execution plan and construction plan, a level one schedule, one line diagrams and project sequencing plans to ensure that the estimate was suitable for the Company's use in obtaining approval from the Commission. In addition, as stated in Ms. Fischer's testimony, the estimate "represents a +/- 10% estimate for equipment and a +/- 10% estimate for construction."

B&V followed the same procedures and practices for developing the project cost as would be used for projects where they are the EPC Contractor. This same estimating template was used for the following B&V EPC projects listed in **Table 8** (provided by B&V). These examples demonstrate that B&V has the experience with several CCGT

projects that have been completed on schedule and on budget, further supporting the reasonableness of these cost estimates.

Project Name	CT Model	Configuration	% Complete	On Budget	On Schedule
Tenaska Westmoreland	Mitsubishi M501J	2x1 CCPP	90%	Y	Y
Oregon Clean Energy	Siemens SGT6-	2x1 CCPP	100%	Y	Y
Enmax Shepard	MHI M501G	2x1 CCPP	100%	Y	Y
FPL Ft. Myers	GE 7FA.05	2x0 SCPP	100%	Y	Y
FPL Lauderdale	GE 7FA.05	5x0 SCPP	100%	Y	Y
Westar Emporia	GE 7FA & LM6000	7x0 SCPP	100%	Y	Y

Table 8

Q. Did Vectren South omit the costs for the lateral pipeline to serve the proposed CCGT from its cost estimate as Mr. Alvarez alleges (Public's Exhibit No. 2, p. 27)?

A. No. It was included as fixed O&M costs, as was indicated in response to discovery.

IV. Recommendations For CCGT Cost Exposures

Q. Industrial Group witness Gorman makes several recommendations for contractual protections when negotiating an EPC for the CCGT. Will Vectren South consider these recommendations?

A. Yes. Mr. Gorman recommends that Vectren South include appropriate contractual provisions that shift the risk of cost overruns on the CCGT to the Company's major equipment suppliers or the EPC contractor. He also recommends performance obligations in its supply contracts to ensure that a new CCGT can meet these expected operating performances.

Q. Has Vectren South decided what method it will utilize to contract for the engineering, procurement and construction of the CCGT?

A. No. Vectren South leans towards and desires a fixed price EPC contract with payments made as specific quality, productivity and performance milestones are achieved. This approach would shift many of the risks of cost overruns to the EPC contractor. We will hire an Owners Engineer with EPC experience to help guide us through the best way to structure the EPC contract to ensure the project is completed on schedule and within budget. Knowing that EPC contractors will add a premium for taking on the risk associated with a firm price Vectren South will evaluate whether the benefits of a fixed price bid are justified by its costs. Even with a firm price, there are risks of change orders and unanticipated issues that can impact the price.

Q. Has Vectren South decided whether it will require performance obligations in any agreement with an EPC contractor?

A. Yes. Specific performance obligations associated with project milestones will be established. Cost sharing incentives for completing specific phases of work under established budgets is something that has worked well for Vectren South on previous capital projects and will be something we'll explore for this project.

Q. Mr. Gorman also recommends that Vectren South share all of the wholesale power margins generated by the plant with customers. Has Vectren South considered this recommendation?

A. Yes. The parties are correct that a significant benefit of the new CCGT is the enhanced ability to participate in the MISO energy market because of the unit's greater efficiency. Vectren South witness Chapman has agreed that in the Company's next base rate case, it will agree to modify its wholesale power sharing mechanism to adjust the portion of

wholesale sales shared with customers from 50% to 100%. As Company witness Lind explains, this will further improve the benefits to customers from the CCGT.

V. Alternative FGD Options Were Explored

Q. Please describe the process Vectren South engaged in to explore scrubber options for Brown.

A. Vectren South hired B&McD to assess the condition of the Brown Scrubber, the estimated remaining life and estimated replacement cost. B&McD associates visited the Brown plant to view and assess the condition, examine historical maintenance documents, become familiar with other environmental controls and how they interact and understand the characteristics of the coal burned.

Q. Why did Vectren South focus on the wet limestone FGD?

A. Based on its investigation, B&McD considered options and concluded that Wet Limestone Forced Oxidation ("LSFO") was the best option for the Brown plant. They based this decision on size of the Brown units and the long track record of high SO_2 removal rates and high operating reliability on high sulfur coal applications. B&McD did consider other technologies, contrary to OUCC witness Aguilar's assertion that no other technologies were evaluated (Public's Exhibit No. 1, p. 20). These were ruled out by B&McD due to their lack of a track record of performance on high sulfur coal, higher long term O&M costs, addition of new environmental equipment such as a fabric filter downstream of the process, concerns with impact to fly ash quality and interaction with other plant environmental controls. Solid performance with high sulfur coal is critical as there is always the possibility for lowering SO_2 removal requirements and emission allowances.

Q. Is the Company presenting additional evidence to demonstrate that other scrubber technologies are not viable?

A. Yes. Vectren South witness Farber has evaluated the scrubbers the OUCC and ICC claim should have been further reviewed and explains why those options are either economically or operationally problematic.

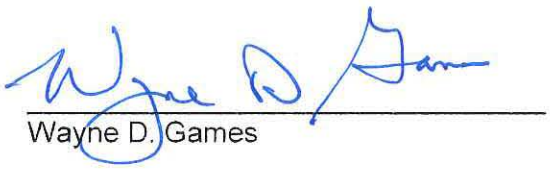
VI. Conclusion

Q. Does this conclude your prepared rebuttal testimony?

A. Yes, at this time.

VERIFICATION

The undersigned, Wayne D. Games, affirms under the penalties of perjury that the answers in the foregoing Rebuttal Testimony in Cause No. 45052 are true to the best of his knowledge, information and belief.



Wayne D. Games

Corrosion Projects 2008-2018

	Grand Total Spend	**$**	**32,081,501**
	Avg Yearly Spend	**$**	**2,916,500**

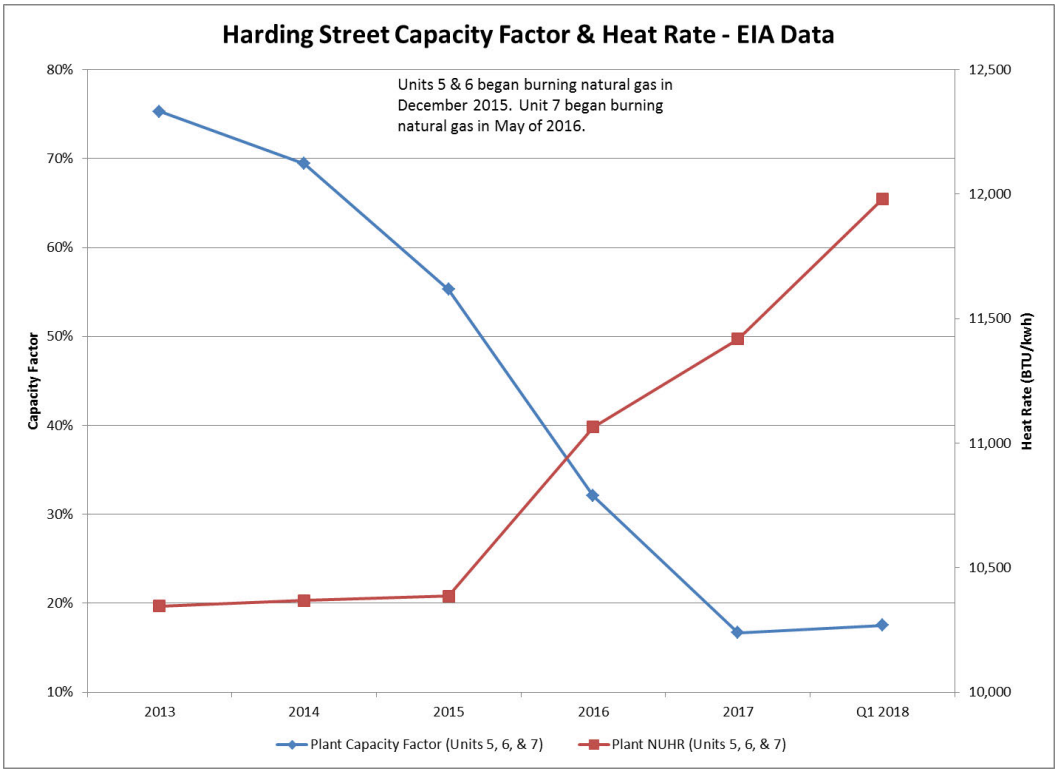
Projects by Year

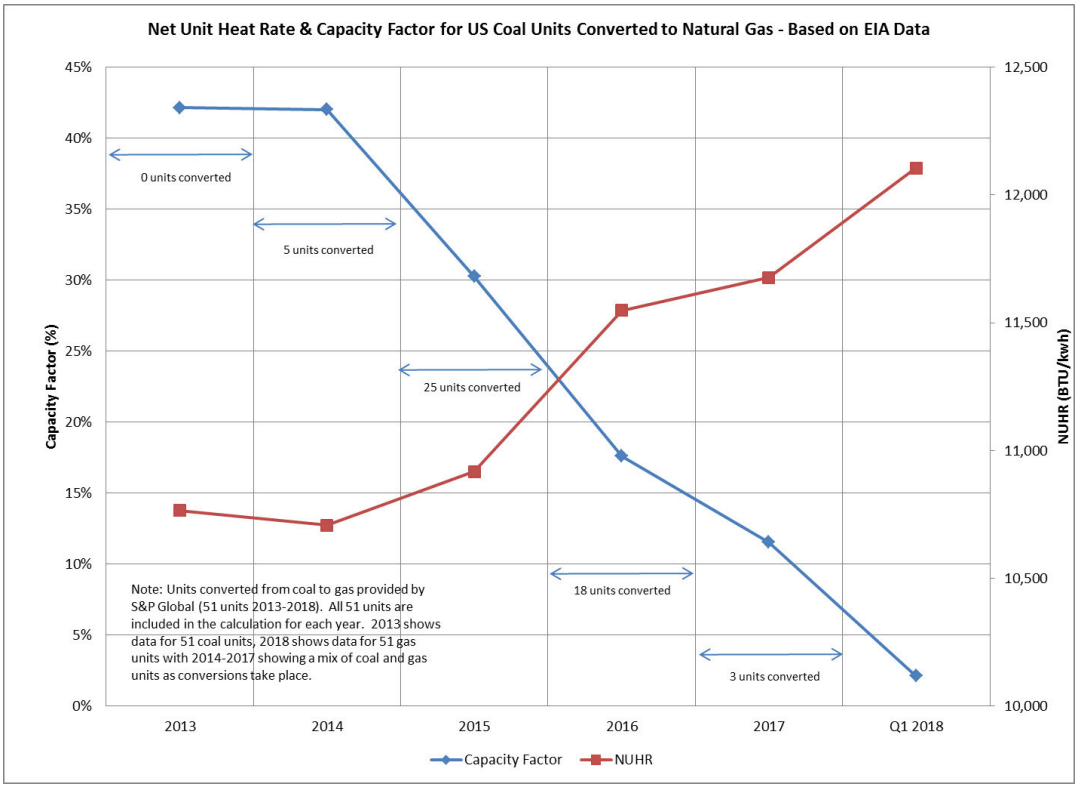
	2018		**Cost**
1	U1 North/South Tower Phase 2	$	886,000
2	U1 - U2 Walk Way	$	350,000
3	U2 Inlet Duct Platforms	$	150,000
	Total	**$**	**1,386,000**
	2017		
1	U2 Coal Silo Replacement/Repair	$	1,000,000
2	U1 North/South Absorber Duct Tower Replacement	$	1,800,000
3	U1 North/South Absorber Duct Tower Replacement Phase 2-4	$	400,000
	Total	**$**	**3,200,000**
	2016		
1	U1 Coal Silo Vertical Wall, Cone Weld Replacement	$	2,900,000
2	U1 Belt Filter Replacement	$	1,300,000
3	U1 Truck Chute Replacement	$	200,000
4	U2 North/ South Tower Absorber Duct Support Tower Phase I	$	250,000
5	U2 Coal Silo Cone Repairs	$	175,000
6	U2 Coal Silo Vertical Wall Assessment	$	25,000
7	U1 Belt Filter Temporary reenforcement	$	10,000
8	U2 Cooling Tower Cell D,E,F &G Structure and Face replacement	$	480,000
9	Coal Yard Hoppers (5)	$	650,000
10	U1/U2 FGD Corrosion Study	$	40,000
11	Ranney Well Floor Sturcture	$	30,000
	Total	**$**	**6,060,000**
	2015		
1	U2 North Belt Filter reenforcement	$	10,000
2	U2 FGD Chute replacement	$	200,000
3	U1 Stack (32) Lower stack band replacement	$	300,000
4	U1 Stack Fan replacement (2)	$	100,000
6	FGD Lime Silo Roof Replacement	$	800,000
7	U2 FGD Building / Floor Structure/ Drains	$	300,000
8	U1 FGD Building Structural/ Columns	$	250,000
9	Coal Hopper (1)	$	200,000
10	U2 FGD Building South Wall Replacement	$	150,000
11	U1 Lime Mixing Tank Stair Tower	$	78,000
	Total	**$**	**2,388,000**
	2014		
1	U2 FGD Thickener Tank Bridge Structure repairs and coating	$	275,000
2	U1 FGD Building Structure and Walls - South and East	$	300,000
3	Carboline Facility Coating Assesment		NA
4	U2 CT Cell Replacement A, B & C	$	3,400,000
5	U2 Lime Mixing Tank Emergency Repairs and Shoring	$	30,000
	Total	**$**	**4,005,000**

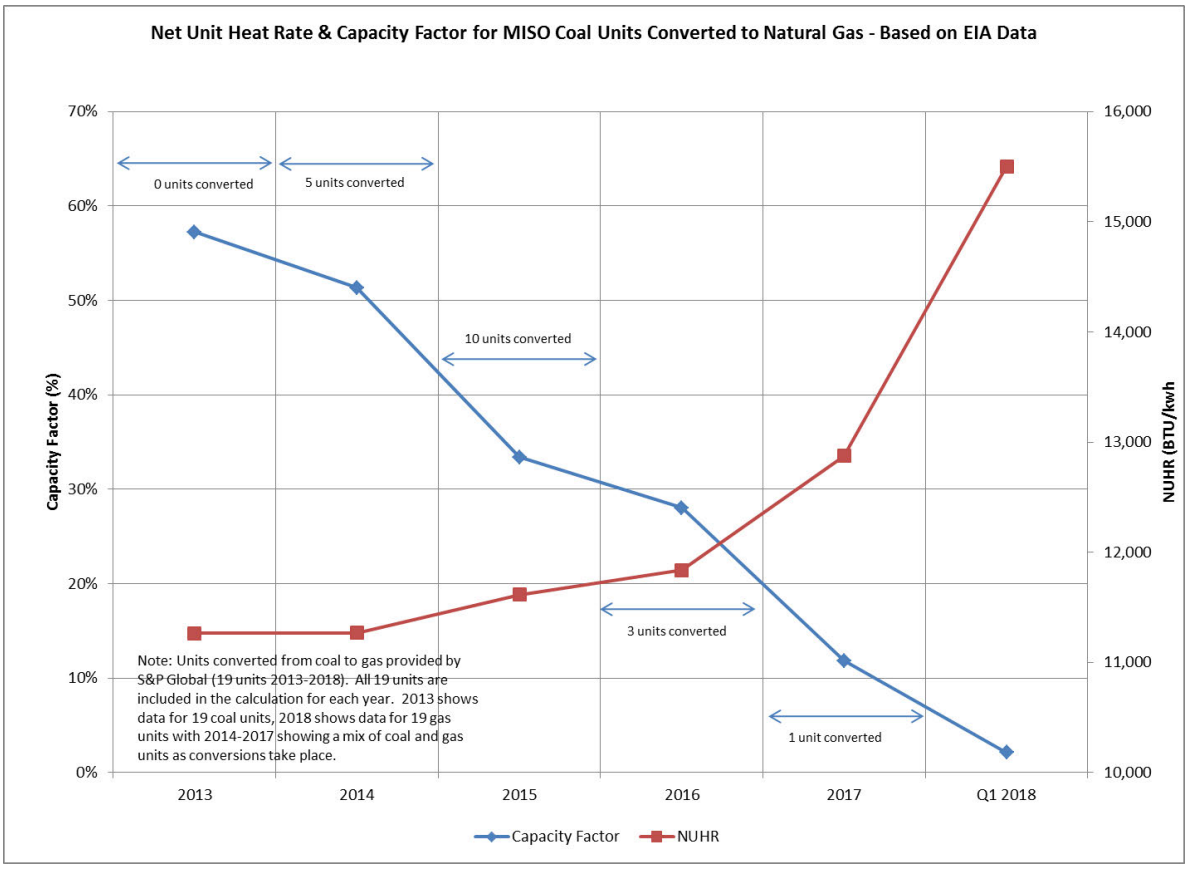
	2013		
1	U2 South Belt Filter Structure Replacement	$	600,000
2	Coal Conveyor C Truss Connecting plate seal and and coating	$	150,000
3	Train Trestle Rebuild	$	2,300,000
4	U2 Absorber Tower Coating	$	800,000
5	U1 Lime Mixing Tank Replacement	$	750,000
6	U1 FGD Pump Room Structure/ Siding and foundation replacement	$	400,000
	Total	**$**	**5,000,000**
	2012		
1	U1 FGD Building Structure and Walls - North and West	$	200,000
2	U1 Cooling Tower Replacement Cells A-G	$	5,950,000
3	U1 Absorber Tower Coating	$	800,000
	Total	**$**	**6,950,000**
	2011		
1	U2 FGD Building Structural Steel and Siding Replacement	$	1,100,000
	Total	**$**	**1,100,000**
	2010		
1	Repair of handrails, ladders, and platform grating on Unit 2 precipitator	$	135,401
2	U1 Outage Cleaning and Patching Holes on Thickener Tank	$	115,851
3	U2 SCR MCC cable enclosure rusted	$	66,767
4	U1 FGD MCC Bldg	$	51,628
	Total	**$**	**369,647**
	2009		
1	PHASE 3 ABB2 FGD (2009) corrosion repair U2	$	395,063
2	3I Eng Study	$	108,170
3	PHASE 3 ABB1 FGD (2009) corrosion repair U1	$	100,264
4	3I Engineering Study	$	93,270
5	Top Edge SE side - Thickner Tank	$	83,299
6	3I Engineering to perform a structural analysis of the FGD area	$	72,784
7	3I Engineering to perform a structural analysis of FGD area	$	63,769
	Total	**$**	**916,619**
	2008		
1	Phase 2 Corrosion repairs - 3I Eng , structural repairs U2 scrubber	$	315,184
2	Phase 2 Corrosion repairs - 3I Eng , structural repairs U1 scrubber	$	211,511
3	UNIT 1 FGD PLATFORM AND HANDRAIL SYSTEM CORROSION REPAIRS	$	179,541
	Total	**$**	**706,236**

Petitioner's Exhibit No. 4-R, Attachment WDG-2R

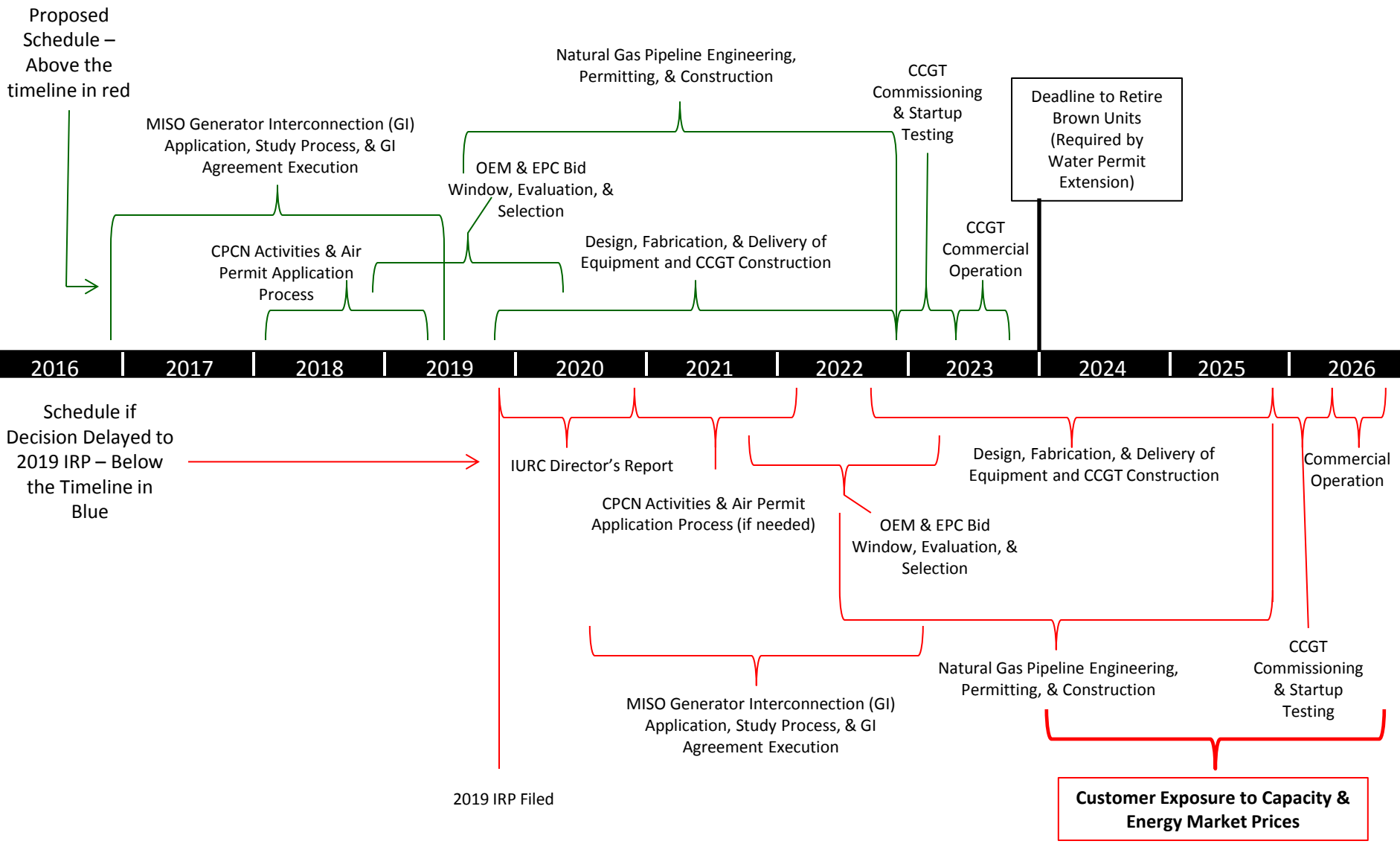
Cause No. 45052

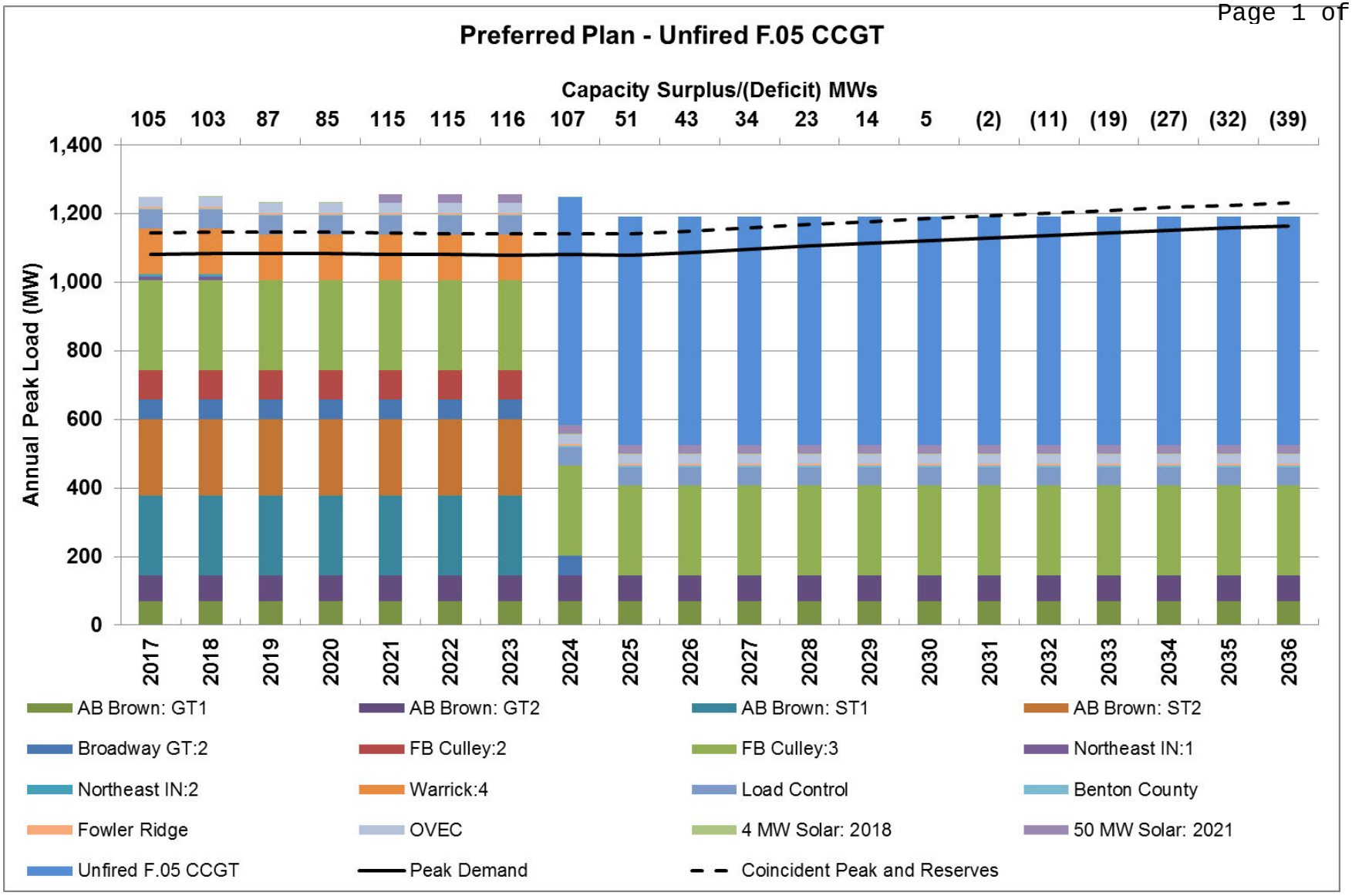





Net Unit Heat Rate & Capacity Factor for MISO Coal Units Converted to Natural Gas - Based on EIA Data
Capacity Factor (%)
NUHR (BTU/kwh
70%
60%
50%
40%
30%
20%
10%
0%
16,000
15,000
14,000
13,000
12,000
11,000
10,000
0 units converted
5 units converted
10 units converted
3 units converted
1 unit converted
Note: Units converted from coal to gas provided by S&P Global (19 units 2013-2018). All 19 units are included in the calculation for each year. 2013 shows data for 19 coal units, 2018 shows data for 19 gas units with 2014-2017 showing a mix of coal and gas units as conversions take place.
2013
2014
2015
2016
2017
Q1 2018
Capacity Factor
NUHR

CCGT Timeline of Activities




Preferred Plan - Unfired F.05 CCGT
Capacity Surplus/(Deficit) MWs
105 103 87 85 115 115 116 107 51 43 34 23 14 5 (2) (11) (19) (27) (32) (39)
Annual Peak Load (MW)
1,400
1,200
1,000
800
600
400
200
0
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036
AB Brown: GT1
AB Brown: GT2
AB Brown: ST1
AB Brown: ST2
Broadway GT:2
FB Culley:2
FB Culley:3
Northeast IN:1
Northeast IN:2
Warrick:4
Load Control
Benton County
Fowler Ridge
OVEC
4 MW Solar: 2018
50 MW Solar: 2021
Unfired F.05 CCGT
Peak Demand
Coincident Peak and Reserves

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 154
EPA COBRA Schahfer Retirement Analysis

An official website of the United States government.

COBRA Web Edition



CO-Benefits Risk Assessment (COBRA) is a screening tool that enables state, local, and tribal government staff and others interested in the effects of air pollution to estimate the air quality and health benefits of different emissions scenarios.

You are using the web-based version of COBRA. For the COBRA desktop application, visit the COBRA download page.

Step 1: Build Scenario

Complete the sections below and click "Add to Scenario."

A. Select Location REQUIRED

Select the states or counties where the emissions changes will occur.

- [ ] Jefferson
- [ ] Jennings
- [ ] Johnson
- [ ] Knox
- [ ] Kosciusko
- [ ] Lagrange
- [ ] Lake
- [ ] La Porte
- [ ] Lawrence
- [ ] Madison

Select All | Deselect All

B. Select Sector REQUIRED

Select the industry or sector where the emissions changes will occur.

Sector

Fuel Combustion: Industrial

Subsector (optional)

All subsectors

Subsector (optional)

All subsectors

C. Modify Emissions REQUIRED

Enter emissions changes for **at least one** of the four pollutants below.

$PM_{2.5}$ (Baseline = 1,409.26 tons)

reduce by | increase by

enter # (tons) (percent)

SO_2 (Baseline = 12,302.81 tons)

reduce by | increase by

enter # (tons) (percent)

NO_x (Baseline = 7,839.23 tons)

reduce by | increase by

enter # (tons) (percent)

VOC (Baseline = 115.38 tons)

reduce by | increase by

enter # (tons) (percent)

NH_3 (Baseline = 35.93 tons)

reduce by | increase by

enter # tons percent

ADD TO SCENARIO

Step 2: Review Scenario

Review the scenario below. To add changes to more locations or sectors, repeat Step 1 to continue building your scenario.

Location(s)	Sector	Emissions Modification(s)	
Jasper, Indiana Porter, Indiana	Fuel Combustion: Industrial	$PM_{2.5}$ reduce by 70 tons SO_2 reduce by 395.04 tons NO_x reduce by 1,351.4 tons	✕

Discount rate:
2%
Custom: enter %

RUN SCENARIO

Step 3: View Results

BUILD NEW SCENARIO

A. Summary of Health Effects Results

Below is a table with the health effects results based on your scenario.

You are viewing results for all contiguous U.S. states. This is because changes in air quality can impact health endpoints in multiple locations due to the transportation of emissions across state and county lines.

Use the filters below to see health effects for a specific state or county.

1. Filter by state:

All contiguous U.S. states

2. Filter by county: (optional)

All counties

Results for: All Contiguous U.S. States

Export: All results | Current filter

Health Endpoint	Pollutant	Change in Incidence (cases, annual)		Monetary Value (dollars, annual)	
		Low	High	Low	High
Mortality *	$PM_{2.5}$ | O_3	9.4	16	$140,000,000	$230,000,000
Nonfatal Heart Attacks	$PM_{2.5}$	3.8	3.8	$320,000	$320,000
Infant Mortality	$PM_{2.5}$	0.049	0.049	$760,000	$760,000
Hospital Admits, All Respiratory	$PM_{2.5}$ | O_3	1	1	$24,000	$24,000
Emergency Room Visits, Respiratory	$PM_{2.5}$ | O_3	12	12	$19,000	$19,000
Asthma Onset	$PM_{2.5}$ | O_3	39	39	$3,000,000	$3,000,000
Asthma Symptoms	$PM_{2.5}$ | O_3	6,400	6,400	$1,500,000	$1,500,000
Emergency Room Visits, Asthma	O_3	0.048	0.048	$40	$40
Lung Cancer Incidence	$PM_{2.5}$	0.38	0.38	$17,000	$17,000
Hospital Admits, Cardio-Cerebro/Peripheral Vascular Disease	$PM_{2.5}$	0.77	0.77	$22,000	$22,000
Hospital Admits, Alzheimers Disease	$PM_{2.5}$	2.7	2.7	$61,000	$61,000

Hospital Admits, Parkinsons Disease	$PM_{2.5}$	0.37	0.37	$8,900	$8,900
Stroke Incidence	$PM_{2.5}$	0.33	0.33	$21,000	$21,000
Hay Fever/Rhinitis Incidence	$PM_{2.5}$ | O_3	250	250	$280,000	$280,000
Cardiac Arrest, Out of Hospital	$PM_{2.5}$	0.078	0.078	$4,800	$4,800
Emergency Room Visits, All Cardiac	$PM_{2.5}$	1.7	1.7	$3,600	$3,600
Minor Restricted Activity Days	$PM_{2.5}$	4,100	4,100	$520,000	$520,000
School Loss Days	O_3	2,400	2,400	$4,000,000	$4,000,000
Work Loss Days	$PM_{2.5}$	690	690	$220,000	$220,000
Total Health Effects from $PM_{2.5}$				**$83,000,000**	**$180,000,000**
Total Health Effects from O_3				**$65,000,000**	**$65,000,000**
Total Health Effects				**$150,000,000**	**$240,000,000**

Note: Dollar amounts shown are based on 2023 currency values. Additionally, all values have been rounded to 2 significant figures. Please export the results in order to see values prior to rounding.

* The Low and High values represent differences in the methods used to estimate some of the health impacts in COBRA. For example, high and low results for avoided premature mortality are based on two different epidemiological studies of the impacts of $PM_{2.5}$ on mortality in the United States.

B. Map of Health Effects and Air Quality Results

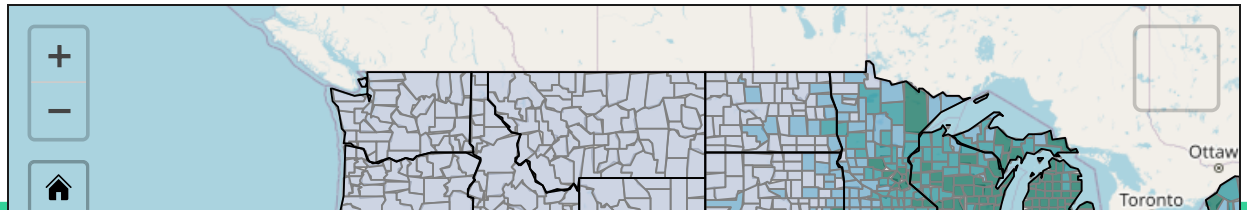
Below is a map showing health effects and air quality data based on your scenario.

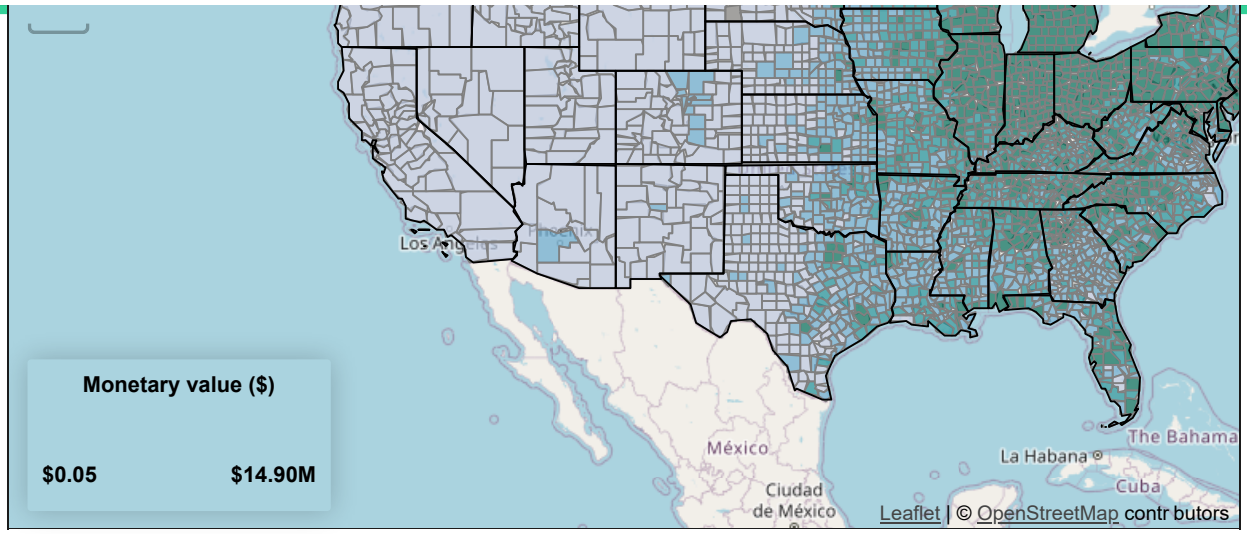
Use the filter below to change the map's data layer. Click on a county on the map to explore the data.

Select the map's data layer:

Total Health Benefits ($, low estimate)

Displaying: Total Health Benefits ($, low estimate)





LAST UPDATED ON APRIL 12, 2021

BEFORE THE UNITED STATES DEPARTMENT OF ENERGY

Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and Northern Indiana Public Service Company LLC	)))))	Order No. 202-26-29
Federal Power Act Section 202(c) Emergency Order: Midcontinent Independent System Operator and CenterPoint Energy Indiana South	))))	Order No. 202-26-30

Exhibit to
Motion to Intervene and Request for Rehearing and Stay of
Public Interest Organizations

Exhibit 155
EPA COBRA Culley Retirement Analysis

An official website of the United States government.

COBRA Web Edition



CO-Benefits Risk Assessment (COBRA) is a screening tool that enables state, local, and tribal government staff and others interested in the effects of air pollution to estimate the air quality and health benefits of different emissions scenarios.

You are using the web-based version of COBRA. For the COBRA desktop application, visit the COBRA download page.

Step 1: Build Scenario

Complete the sections below and click "Add to Scenario."

A. Select Location REQUIRED

Select the states or counties where the emissions changes will occur.

- [ ] Warren
- [x] Warrick
- [ ] Washington
- [ ] Wayne
- [ ] Wells
- [ ] White
- [ ] Whitley
- [ ] Iowa
- [ ] Kansas

Select All | Deselect All

B. Select Sector REQUIRED

Select the industry or sector where the emissions changes will occur.

Sector

Fuel Combustion: Electric Utility

Subsector (optional)

All subsectors

Subsector (optional)

All subsectors

C. Modify Emissions REQUIRED

Enter emissions changes for **at least one** of the four pollutants below.

$PM_{2.5}$ (Baseline = 2,770.88 tons)

reduce by | increase by

enter # (tons) (percent)

SO_2 (Baseline = 6,509.96 tons)

reduce by | increase by

enter # (tons) (percent)

NO_x (Baseline = 9,745.69 tons)

reduce by | increase by

enter # (tons) (percent)

VOC (Baseline = 282.18 tons)

reduce by | increase by

enter # (tons) (percent)

NH_3 (Baseline = 1.11 tons)

reduce by | increase by

enter # tons percent

ADD TO SCENARIO

Step 2: Review Scenario

Review the scenario below. To add changes to more locations or sectors, repeat Step 1 to continue building your scenario.

Location(s)	Sector	Emissions Modification(s)	
Warrick, Indiana	Fuel Combustion: Electric Utility Coal	$PM_{2.5}$ reduce by 9.2 tons SO_2 reduce by 247.83 tons NO_x reduce by 320.79 tons	✕

Discount rate:
2%
Custom: enter %

RUN SCENARIO

Step 3: View Results

BUILD NEW SCENARIO

A. Summary of Health Effects Results

Below is a table with the health effects results based on your scenario.

You are viewing results for all contiguous U.S. states. This is because changes in air quality can impact health endpoints in multiple locations due to the transportation of emissions across state and county lines.

Use the filters below to see health effects for a specific state or county.

1. Filter by state:

All contiguous U.S. states

2. Filter by county: (optional)

All counties

Results for: All Contiguous U.S. States

Export: All results | Current filter

Health Endpoint	Pollutant	Change in Incidence (cases, annual)		Monetary Value (dollars, annual)	
		Low	High	Low	High
Mortality *	$PM_{2.5}$ | O_3	2.5	3.9	$36,000,000	$58,000,000
Nonfatal Heart Attacks	$PM_{2.5}$	0.92	0.92	$78,000	$78,000
Infant Mortality	$PM_{2.5}$	0.011	0.011	$170,000	$170,000
Hospital Admits, All Respiratory	$PM_{2.5}$ | O_3	0.28	0.28	$6,400	$6,400
Emergency Room Visits, Respiratory	$PM_{2.5}$ | O_3	3.3	3.3	$5,300	$5,300
Asthma Onset	$PM_{2.5}$ | O_3	10	10	$790,000	$790,000
Asthma Symptoms	$PM_{2.5}$ | O_3	1,700	1,700	$430,000	$430,000
Emergency Room Visits, Asthma	O_3	0.014	0.014	$12	$12
Lung Cancer Incidence	$PM_{2.5}$	0.083	0.083	$3,700	$3,700
Hospital Admits, Cardio-Cerebro/Peripheral Vascular Disease	$PM_{2.5}$	0.17	0.17	$4,900	$4,900
Hospital Admits, Alzheimers Disease	$PM_{2.5}$	0.67	0.67	$15,000	$15,000

Hospital Admits, Parkinsons Disease	$PM_{2.5}$	0.078	0.078	$1,900	$1,900
Stroke Incidence	$PM_{2.5}$	0.072	0.072	$4,500	$4,500
Hay Fever/Rhinitis Incidence	$PM_{2.5}$ | O_3	66	66	$74,000	$74,000
Cardiac Arrest, Out of Hospital	$PM_{2.5}$	0.017	0.017	$1,000	$1,000
Emergency Room Visits, All Cardiac	$PM_{2.5}$	0.38	0.38	$820	$820
Minor Restricted Activity Days	$PM_{2.5}$	890	890	$110,000	$110,000
School Loss Days	O_3	690	690	$1,200,000	$1,200,000
Work Loss Days	$PM_{2.5}$	150	150	$47,000	$47,000
Total Health Effects from $PM_{2.5}$				**$19,000,000**	**$40,000,000**
Total Health Effects from O_3				**$20,000,000**	**$20,000,000**
Total Health Effects				**$39,000,000**	**$60,000,000**

Note: Dollar amounts shown are based on 2023 currency values. Additionally, all values have been rounded to 2 significant figures. Please export the results in order to see values prior to rounding.

* The Low and High values represent differences in the methods used to estimate some of the health impacts in COBRA. For example, high and low results for avoided premature mortality are based on two different epidemiological studies of the impacts of $PM_{2.5}$ on mortality in the United States.

B. Map of Health Effects and Air Quality Results

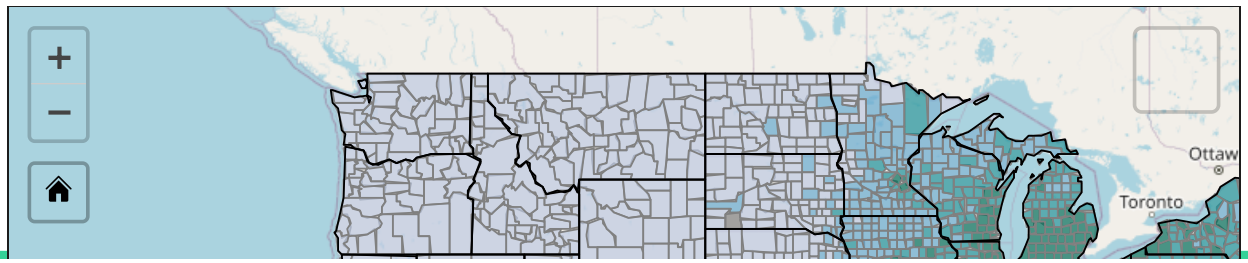
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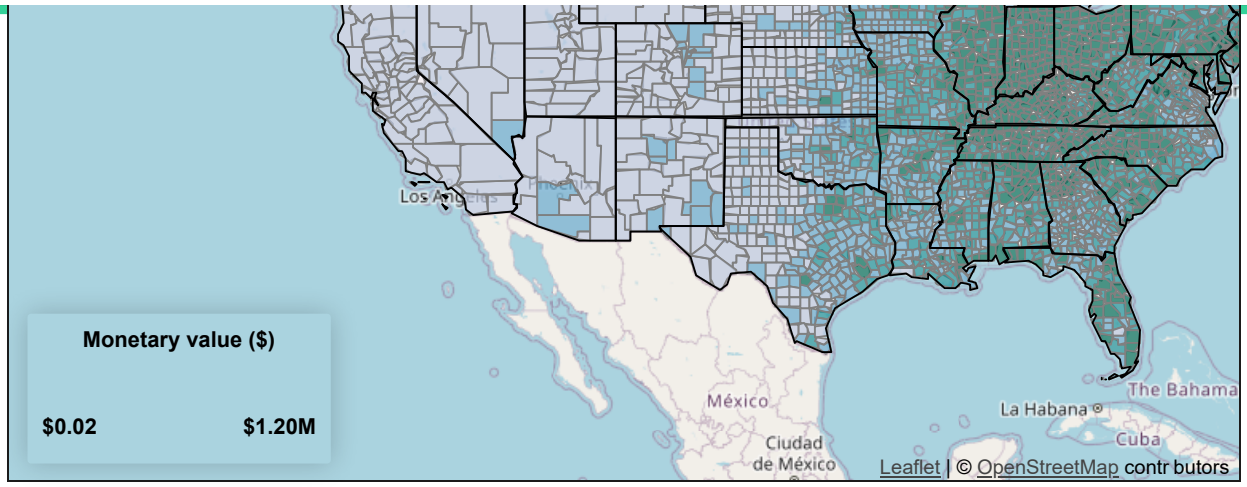
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Select the map's data layer:

Total Health Benefits ($, low estimate)

Displaying: Total Health Benefits ($, low estimate)





LAST UPDATED ON APRIL 12, 2021